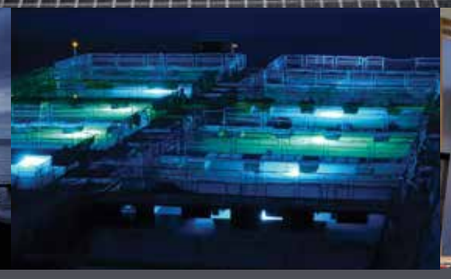
CAGE FARMING AQUACULTURE 2014/2015-E

Cage Farming Aquaculture 2014 2015



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AKVA GROUP™

Your Aquaculture Technology and Service Partner

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wavemaster™ polarcirkel™ fishtalk™ akvasmart™

Reliable and innovative aquaculture solutions combined with professional service and support

As a partner our mission is to improve your profitability and sustainability.

During more than 40 years as innovator and provider of technology and services to the global aquaculture industry, we in AKVA group have learned what really matters to our customers as well as to ourselves. Partnerships, good partnerships – enabling us to contribute solutions and services that make our customers successful in developing and operating sustainable and profitable aquaculture operations. Good Partnerships, where our contribution to solutions and services earn us the opportunity to develop AKVA group as a sustainable and profitable company.

We will continue to build AKVA group with this as our mission. We will be focused on our customers' needs, being attentive and responsive. We will develop and use our knowledge to contribute solutions and services that lifts our customers performance.

We will take pride in being reliable and honest in what we do and how we act, and we will use our enthusiasm to generate the energy and joy needed to take our customers as well as AKVA group forward.

In AKVA we strongly believe that we can make a difference. We are proud to be part of the global aquaculture industry which is playing a crucial role providing healthy seafood world wide.

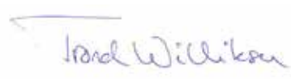
We are partners – and in it for the long run.

AKVA group is a solid partner with offices and facilities in Norway, Chile, Denmark, Scotland, Iceland, Canada, Australia and Turkey. With 8 offices and several agents and distributors around the globe AKVA group is present in all markets worldwide. AKVA group is a unique partner with the capability to offer both cage farming and land based aquaculture operations with complete technical solutions and service.

The company holds strong, well-known brand names and the product line range from plastic and steel cages, mooring systems, nets, net cleaners, work boats, feed barges, feed systems, camera systems, environmental sensors, underwater lights, production and process control software, recirculation systems, PE piping systems, farm design, on-site services and training courses.

Partnering with AKVA group allows customers to keep their focus on fine tuning farm operations to increase profitability, while sharing the technical challenges with a reliable partner with the right people, the right technology and the right knowledge to achieve excellence.

AKVA group is a leading technology and service partner to the aquaculture industry worldwide



CEO, AKVA group ASA.

Project planning

Two heads think better than one, says an old proverb. In terms of planning an aquaculture operation it translates into allowing people with different know-how to work together in the planning process. Letting AKVA's technical experts team up with your own operational experts will ensure well founded and correctly dimensioned farming solutions.

Budgeting

Budgeting means planning years ahead to create an image of the size and shape of your operations.This is imperative to secure adequate financing and proper financial control. Allowing technical considerations into the budget will also help you identify constraints or bottle-necks in your operation.

Technical solutions

Are you happy with standard solutions or does your operation or managers require fine tuning of some of the hardware? In a carefully planned complete project, specific hardware requirements can be taken into account at an early stage so they won't add extra costs or delays along the way.

Installations

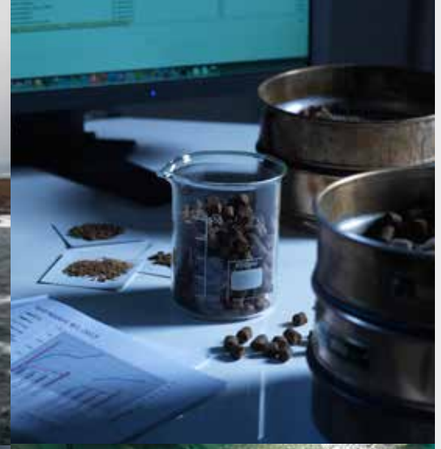
Plug and play may be the preferred mode for anyone wanting to connect two pieces of equipment together. In an aquacul-ture facility, putting the pieces together may not be quite as simple, although it might seem like it when our experts are at work. Professional commissioning and start-up will prevent future headaches and costly mistakes.

Service & support

Systems running year after year, some-times in extreme weather, will always be subject to extensive wear and tear. In order to maintain reliable operations, preventive service agreements and regular maintenance are critical. AKVA group's Service department has decades of experience in supporting and performing maintenance under such conditions.

Product training

Knowledge is always an important part of successful farm operations. Sufficient training of your staff and managers will minimize the amount of frustration that builds up while browsing through a manual in search of a solution to a problem. Hands-on training of staff, face-to-face is always the most effective method and a wise investment.



Worldwide Aquaculture

Reliable and efficient solutions

AKVA group had designed and supplied professional and commercially sound projects worldwide.
From complete cage farms for many fin fish species, to land based hatcheries with recirculation systems to break-through projects with new species.

AKVA group is the only supplier with the capability to offer both cage farming and land based aquaculture operations with complete technical solutions. Being a dedicated AKVA group partner means leaving responsibility for technical matters to external experts, while allowing your own personnel to focus on biology and production.

AKVA group's team of professionals knows what is important to succeed in the aquaculture industry. We are able and willing to take on the responsibility for delivering reliable technology with the quality, standards and service level needed to minimize the risk of technical problems which may lead to production down-time and associated financial losses.

We will ensure the integration and quality of our work by undertaking thorough and detailed planning and pre-project design of your farm.

From single components to complete aquaculture solutions with professional service and support.

Cage Farming Aquaculture - Complete Solutions Worldwide

Plastic Cages
Feed Barges
Software
Steel Cages
Feed Systems
Work Boats
Environmental Sensors
Net Cleaning
Camera Systems
Underwater Lights
Nets
Current profiler Sensors
Mooring systems
Mort collector systems

Feed Barges

AKVA group is the world´s leading supplier of feed barges with decades of experience and nearly 300 barges delivered worldwide.

Feed Systems

The central feed system was invented by AKVA group in 1980 and Akvasmart CCS is today the world´s most popular and reliable feed system.

Cages

AKVA group is the leading supplier of both plastic and steel cages in aquaculture, and has since 1974 delivered more than 60,000 cages.

Software Solutions

Fishtalk is a unique IT concept and tool that provides integrated operations and biological production. AKVAconnect is the latest farm operations and technical control software platform.

Camera and Sensor Systems

Advanced video camera and sensor systems monitor both fish, the feeding process and the environment. This ensures optimum operations and a healthy fish.

Workboats

The robust Polarcirkel workboats offers great design, quality build, unique flexibility, safety and low maintenance.

Cages

The world´s leading cage supplier

AKVA group is the world’s leading supplier of both plastic and steel cages. Polarcirkel, the most recognized brand in aquaculture, invented the plastic cage concept in Norway in 1974, and has since supplied more than 45,000 cages worldwide. The renowned Wavemaster steel cages originated in Ireland in 1985, and more than 15,000 cages have since been delivered globally.

In order to ensure the highest possible quality, competitive pricing and on-time deliveries, the cages and components are manufactured in many different regions. All cages are installed by professional installation teams, and serviced by professional AKVA group service technicians.

AKVA group invests heavily in innovative and professional R&D in order to remain the leading supplier of cages, not only to improve products in the short term, but also to look into the future of tomorrow’s demands for cage technology.

Polarcirkel All-Plastic-Cages

A safe and stable platform designed for extreme weather conditions.

A well proven concept in flexible cage design

Polarcirkel Cage history

Experience is a crucial success factor in the fish farming business. AKVA group (Polarcirkel) invented the plastic cage in 1974, and has since then supplied more than 45.000 Polarcirkel Cages and 15.000 Polarcirkel Boats. The cages are made from PE raw materials especially suited for the dynamic loads of the sea, and are available in a wide range of models, shapes and sizes to suit individual needs.

Newspaper photo presenting the first Polarcirkel cage in 1974.

Many have tried to copy these products, but none have managed to match the genuine Polarcirkel designs and quality builds. Plastic cages started out as small single pipe circles, but now our largest models approach 200m circumference, and with floating pipes of 500mm diameter. Both circular and square cage systems are available. Combined with AKVA group´s global sales and service network, the Polarcirkel Cage is well proven and recognized worldwide.

Photos showing today's large 500mm cages compared to the 225mm "Gigante" cage 20 years ago!

Forget corrosion! Polarcirkel bracket after 10 years in saltwater!

Long life - built to withstand extreme weather conditions

Extensive use of Polyethylene in our latest Pressure Injection Moulded (PIM) brackets eliminates corrosion, minimizes expensive and difficult maintenance, and substantially increases cage lifespan compared to steel brackets. This is especially important in areas with high salinity, warm water temperatures and choppy seas.

Cages designed for extreme weather conditions, such as here on Norway's stormy coastline at 70° North.

Only strong and high quality PE is used for Polarcirkel brackets, while many suppliers use weak and low quality rotationally moulded medium and low density Polyethylene. This makes the Polarcirkelbrackets superior in terms of structural strength, durability and UV resistance. This is especially important in high energy offshore farm sites and areas with high UV radiation from the sun.

All Polarcirkel Cages are NS9415 certified.

For areas prone to icing, such as Norway, Canada and Russia,, another critical advantage of the Polarcirkel PE brackets is that they will not ice up as steel brackets do. Icing is a dangerous safety issue for all floating structures, including cages.

Heavy ice overloads the cage, reduces stability and jeopardizes overall cage integrity. As the name indicates, the Polarcirkel cages are built for extreme arctic conditions!

Polarcirkel PE brackets are tested in arctic areas to withstand extreme icing such as here in the Russian Sea.

All Polarcirkel Cage designs are carried out by our professional R&D department. Independent marine engineering consultants are also involved in advanced static and dynamic load calculations to ensure all designs meet or exceed expected real life loads as well as applicable industry standards.

Polarcirkel Cages are used all over the world, such as here in Tunisia.

polarcirkel™

The safest and most escape proof cages on the market

Strong and rigid PE hand rails.

Net Hooks provide simplified net handling and a secure attachment point for your net.

The fully integrated anti-skid walkway panels fit securely between the two floating pipes, forming a stable and safe working surface.

Styrofoam core makes the cage virtually unsinkable even in cases of severe damage.

A secondary redundancy safety chain placed inside the outer floating pipe is optional.

All-rope solution. No shackles or bolts that can corrode or damage the net.

The Polarcirkel Sinker Tube consists of a 200-280mm heavy walled PE pipe filled with chain or wire rope at specified weight.

Extra wide catamaran design

Polarcirkel's extra wide catamaran design ensures maximum cage stability and railing stiffness. Combined with strong stanchions and interlocked railing design, this makes the Polarcirkel Cages safe and easy to work on without sacrificing seaworthiness and strength.

Due to its low weight-to-strength ratio, the Polarcirkel Cages have very high reserve buoyancy compared to cages with other brackets. This easily results in our larger cages having up to 4-5 metric tons higher reserve buoyancy. This substantially increases cage safety margins in case of sudden operational problems that weigh down the cages (dirty nets, icing, storms, strong currents etc.).

Unique redundancy systems

In addition to obvious redundancy safety factors such as individually secured brackets, individually secured anchoring connectors and Styrofoam inside the outer floating pipe pipes, Polarcirkel also offer an optional secondary continous safety chain inside the outer floating pipe. This will serve as an unbreakable barrier in case the cage integrity is severely compromised. Keeping the chain inside the pipe leaves it out of the water until needed and maintains a clean exterior cage layout. All of this makes the Polarcirkel Cages the safest and most escape proof cages on the market!

The new Pressure Injection Moulded brackets design provides superior strength.

Safe Polarcirkel PE walkways

In order to increase crew safety on fish farms, another Polarcirkel innovation was launched in 1999, the integrated Polarcirkel PE walkways.The anti-skid walkway panels fit securely between the two floating pipes, forming a stable and safe working surface. The PE pressure moulded panels are held in place with strong and flexible continuous 50mm PE tubing inter locking the panels to the PIM brackets.

Proven Sinker Tube concept

As cages grew bigger and nets became harder and harder to control in strong currents, Polarcirkel invented the sinker tube concept in 1989. A concept that later has been adopted as an industry to keep nets stretched out and weighed down.

The Polarcirkel Sinker Tube consists of a 200-280mm heavy walled PE pipe filled with steel wires or chain (typically 20-70 kg/m). It is supported by strong ropes fastened through the stainless steel sleeve in the PIM brackets.

All the weight of the net and sinker tube system is supported by the floating pipe - NOT by the handrail.

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To avoid fish escapes we need to ensure that all potential sources of chafe and net damage are eliminated.

Simplified net handling and maintenance

A wide range of accessories with smart features

AKVA group offers a wide range of optional accessories for the cages. This equipment will improve the safety and efficiency on the fish farms. Dedicated accessories will also make it easier for the farm staff to do their job. Here´s some of the accessories we can recommend, anti-skid walkway panels, center support stands, cart wheels, net hooks, harvest trawl float rope etc.

Various types of net hooks are available. The systems simplify net handling on the cages and provide secure attachment points for your nets.

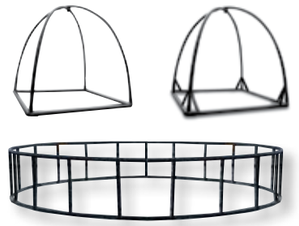
Most plastic cages are moored in a grid system and include sinker tube, center support stand, feed system/barge, cameras and sensors.

Both fiber nets and non fiber nets (EcoNet) can be installed in all Polarcirkel cages.

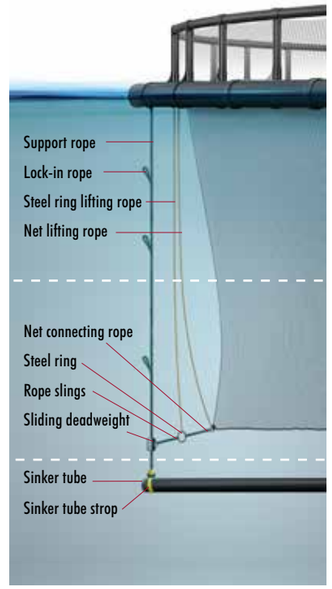
When harvesting, the net volume is reduced by lifting thr vertical ropes of the sinker tube system. This leaves no load on the handrails.

Rugged Polarcirkel Cages combined with a Wavemaster Feed Barge will always makes a perfect match.

Polarcirkel "Cart Wheels" Center Support Stands can be offered with circumference from 30 up to 72m.



Center Support Stands keeps the bird nets high off the water. Standard sizes from 4m to 5m high. Other hights can also be delivered on request.



Sliding deadweight principle - a new sinker tube solution

In terms of our sinker tube concept, this means going from chain to an all-rope solution, including the use of new type of sliding dead weights as an option. This means no potential chafe from metal parts, practical ways of handling the net and replacing parts, excellent stretching out of the net (maximum water exchange) and no shackles or bolts that can loosen or corrode.

When you need to lift or lower the net for harvesting, grading etc, the sinker tube is lifted 5m at a time using the lifting and lock-in loops in the support ropes. These rope runs through the PIM cage bracket and locking pins are used to secure it at the various levels. Number of loops and net hooks can be customized to suit individual needs.

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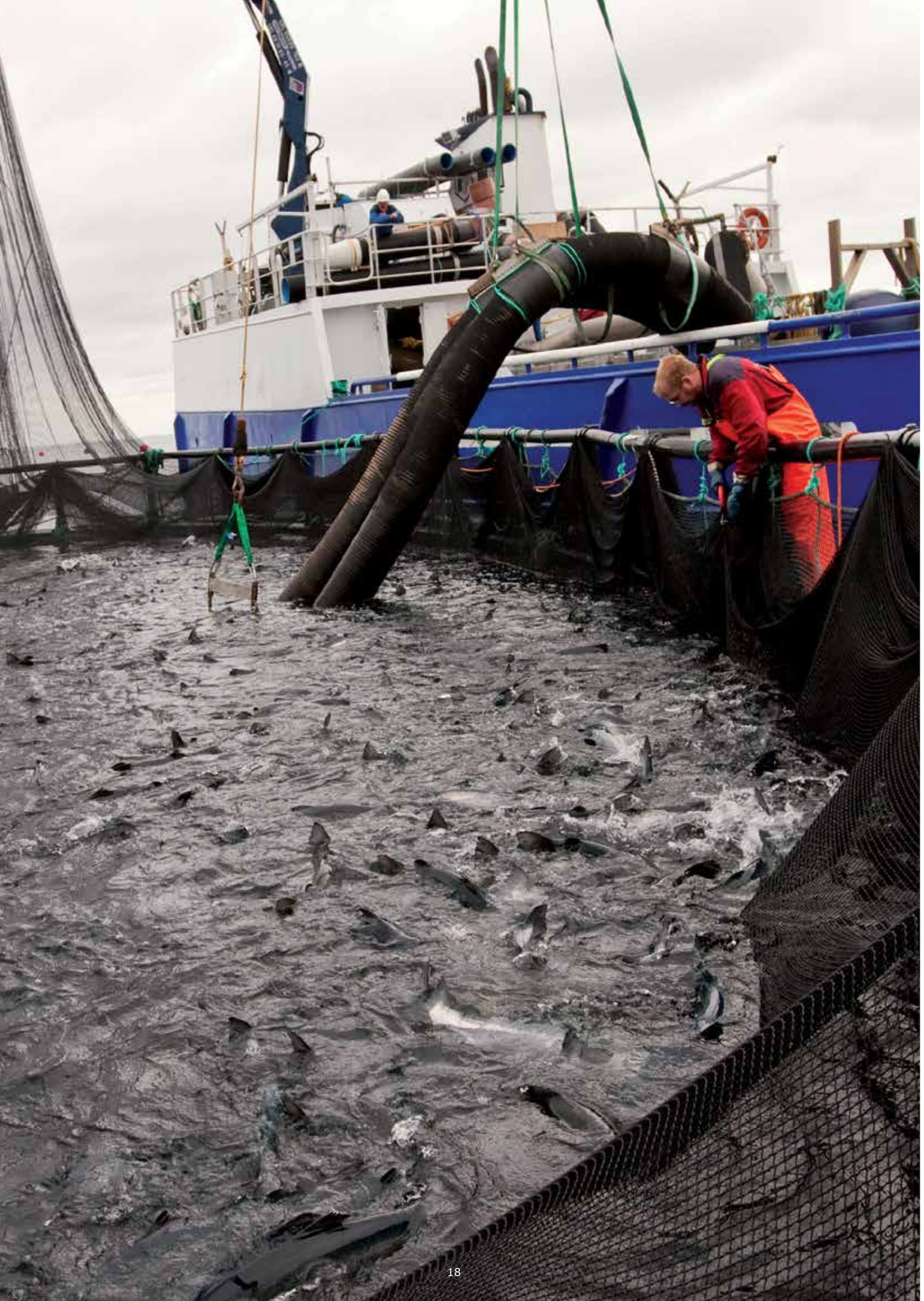

Plastic Cage Specifications

Cage Models:	225/250	315	400	450	500	Comments
Cage sizes – Floating pipe diameter:	225/250mm (9”/10”)	315mm (12”)	400mm (16”)	450mm (18”)	500mm (20”)	Imperial sizes to be confirmed.
Cage sizes – Standard circumferences:	40 - 90m (130 - 300’)	60 - 100m (200 - 330’)	90 - 160m (300 - 530’)	120 - 160m (400 - 530’)	130 - 200m (430 - 660’)	At centre of inner floating pipe.
Cage sizes – Standard diameters:	13 – 29m (42 – 94’)	19 – 32m (63 – 104’)	29 – 51m (94 – 167’)	38 – 51m (125 – 167’)	41 – 64m (136 – 209’)	At centre of inner floating pipe.
Center - center distance between floating pipes:	52cm (20”)	66cm (26”)	85cm (33”)	100cm (39”)	110cm (43”)	
Bracket – PE Injection Moulded (new PIM Type):	–	Yes	Yes	Yes	Yes	PIM Bracket (Pressure Injection Moulded Bracket) with plastic uprights.
Bracket – PE Welded (original “Nova” type)	–	Yes	Yes	–	–	Original welded NOVA bracket.
Bracket – PE Injection Moulded (original type):	Yes	-	–	–	–	Original injection moulded bracket.
Standard distance between brackets:	2m (6’ 7”)	2m (6’ 7”)	2.5m (8’ 2”)	2.5m (8’ 2”)	2.6m (8’ 6”)	Can be customized to fit nets.
Dimension – PE Handrail Upright:	125mm (5”)	125mm (5”)	160mm (6,5”)	160mm (6,5”)	160mm (6,5”)	Not applicable for steel brackets.
Dimension – Handrail Pipe:	110mm (4,5”)	110mm (4,5”)	140mm (5,5”)	140mm (5,5”)	140mm (5,5”)	Applies for both PE and steel brackets.
Net hook on uprights:	PE (SS opt.)	PE (SS opt.)	Stainless Steel (12mm)	Stainless Steel (12mm)	Stainless Steel (12mm)	One single hook per upright included. Custom hooks available
Polystyrene Safety Floatation added:	Only inner pipe	Only inner pipe	Only inner pipe	Only inner pipe	Only inner pipe	Available in all floating pipes on request.
Available with – Secondary Safety Chain (redundancy):	Inside outer pipe	Inside outer pipe	Inside outer pipe	Inside outer pipe	Inside outer pipe	Continuous internal safety chain inside the outer floating pipe for an extra safety
Materials used – PE80 & PE100:	Yes	Yes	Yes	Yes	Yes	Applies to plastic components.
NS-EN ISO 9001:2000 Certification:	Yes	Yes	Yes	Yes	Yes	The Polarcirkel factory is ISO 9001 and ISO 14001 certified.
Norwegian Standard – NS9415 Certified:	–	Yes	Yes	Yes	Yes	Mandatory for Norway only.
Available as Two-Ring Cage:	Yes	Yes	Yes	Yes	Yes	Standard Cage
Available as Three-Ring Cage:	Yes	-	–	–	–	
Option:	Yes	Yes	Yes	Yes	Yes	
Option:	Yes	Yes	Yes	Yes	Yes	Mainly used for 315 model and up.
Avail. as Submergible Cage:	Yes	Yes	Not yet	Not yet	Not yet	Ask for specific details.
Polarcirkel Square Cages - Standard sizes available:	3x3m (10x10’) / 5x5m (17x17’) / 7x7m (23x23’) / 9x9m (30x30’) / 11x11m (37x37’) 13x13m (43x43’)					* Available outside Norway only – as individual cages or cage systems.

Polarcirkel quality and certification

All Polarcirkel Cages are manufactured and assembled in accordance with AKVA group’s Quality Assurance System (ISO 9001 and ISO 14001) which is certified by DNV (Det Norske Veritas). All cages in Norway are designed in accordance with NS9415 (Norwegian Standard 9415 for cage farming equipment to prevent fish escape).

AKVA group delivers complete cage farming solutions worldwide.

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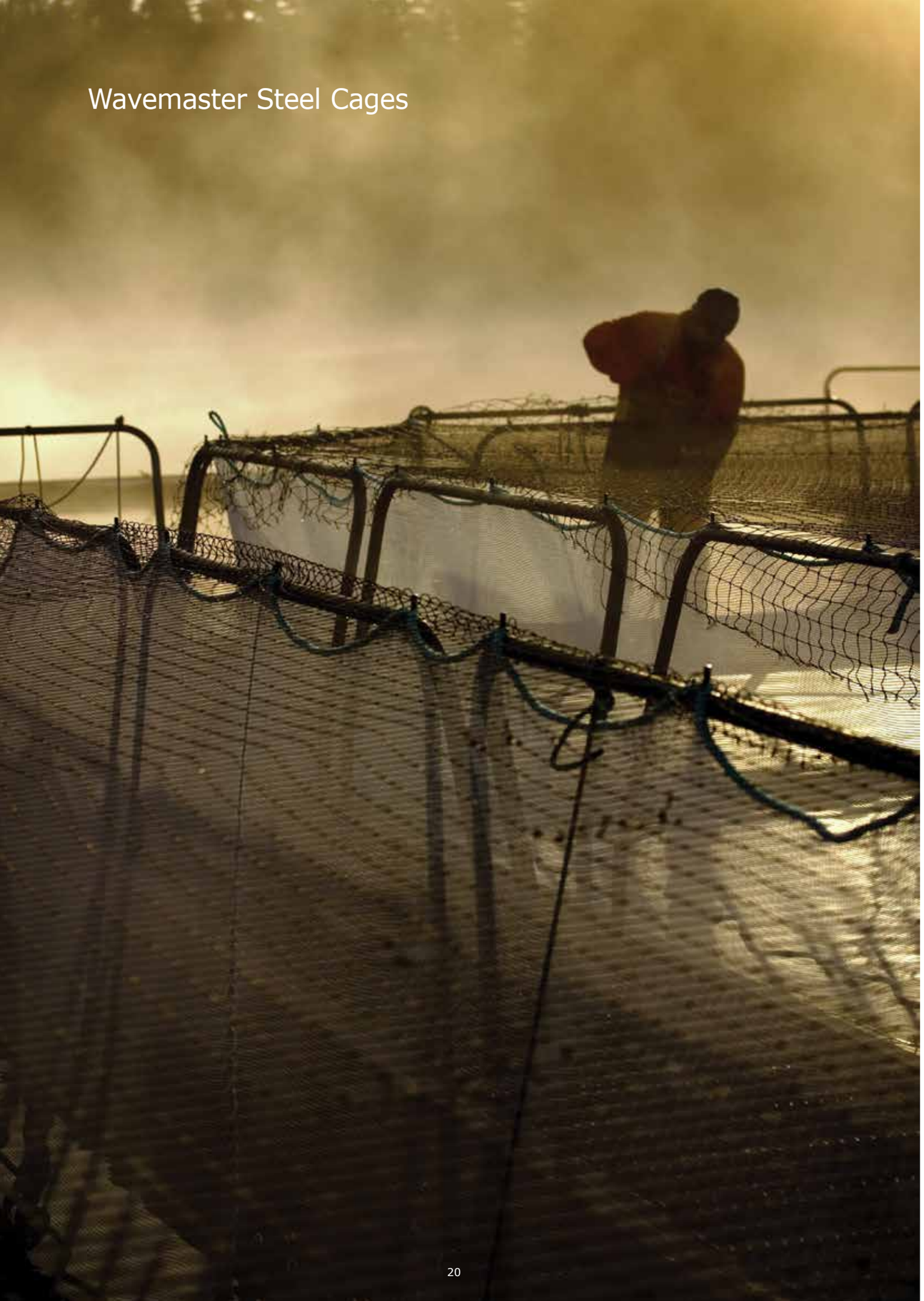


Wavemaster Steel Cages

Safe and strong steel cage solutions

Wavemaster Cage history

Wavemaster began producing steel cages in Ireland in 1985, in Canada in 1988 and in Chile in 1990, and today supplies cages to all world markets. The large number of cages currently in use on a wide variety of sites, operating under diverse wave and wind conditions world wide, has demonstrated the reliability of the Wavemaster design.

The first Wavemaster cages was designed and delivered in Ireland in 1985.

Produced locally and designed to suit local markets, Wavemaster provides the most cost effective steel cages available to the industry. Steel cages are suitable for sites with moderate exposure and strong tidal currents.

Combined with a global sales and service network, the Wavemaster Steel Cages are a well proven concept.

Wavemaster has a proven track record of installations on a wide range of sites and in many different climates around the world, such as here in Chile.

The wide walkways provide superior support for predator nets, well spaced from the fish net. This is a crucial feature for some areas.

Superior design makes an ideal platform for fish farming

Wavemaster is the world's leading brand of steel cages with over to 15.000 cages delivered since 1985! The cages provide an ideal platform for fish farming. Wide non-slip walkways with high free-board around all sides of the cages allow the operator full flexibility of operation and easy access from cage to cage. This is becoming essential for good fish husbandry and maintenance.

The compactness and simplified mooring arrangements make Wavemaster Steel Cages a very attractive option for many sites.

Safe and stable cage construction make a safe workplace.

Wavemaster cages are available in a wide range of models, single- or double string systems and sizes up to 40x40m to suit individual needs.

The upper surface of each float incorporates sloping surfaces so that any feed or debris deposited can be washed away by wave action or water hose. High reserve buoyancy is crucial in case of sudden excessive or mooring loads.

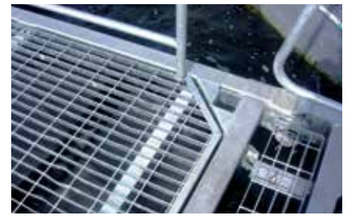
Hot dip galvanizing

All components are hot dipped galvanized after manufacture. This has proven to be the most effective and durable coating for use on fish pen structures.

Wavemaster cages produced by AKVA group Chile.

Ongoing R&D

All of the Wavemaster designs are continuously updated to reflect operating experience and the changing work practises of the fish farmers using the equipment. This continues to make Wavemaster the leading edge steel cage in the fish farming industry.

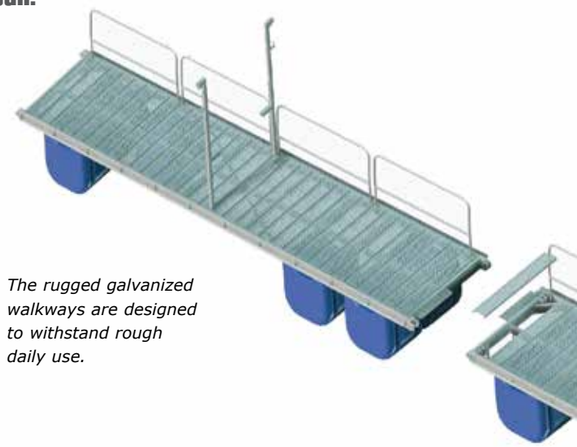


Wavemaster cages include smart solutions for fully integrated non-slip walkways, net supports and floats with self-draining top.

wavemaster™

A trusted and well proven steel cage concept

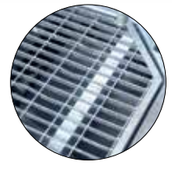
Patented moulded rubber hinge system reduces loads and increases life-span.



The rugged galvanized walkways are designed to withstand rough daily use.

All components are hot dip galvanized.

Bushing type hinge for less exposed sites.



Self-draining tops make it easier to maintain.

Secure floats filled with expanded polystyrene.

A wide range of strong, high quality mooring systems are also available in various dimensions.

The removable handrail system provides tie off points and posts to support the net.

Feed barges can be moored at the end of steel cages and provide easy access to the cages for farm staff.

Wavemaster steel cages are also available with driveable centre walkway, such as here in Canada.

wavemaster™

Steel Cage Specifications

Wavemaster Cages:	EX-1	EX-2	Comments
Model description:	High Performance	High Exposure	Please consult your Wavemaster representative for expert advice on proper model selection.
Cages sizes available - inner measurements:	10x10m (30´x30´) 12x12m (40´x40´) 15x15m (50´x50´) 20x20m (60´x60´) 25x25m (82´x82´) 30x30m (100´x100´) 40x40m (130´x130´)	25x25m (82´x82´) 30x30m (100´x100´) 40x40m (130´x130´)	Others sizes available on request.
Main walkway width:	1.1 - 2.5 m (3´3" - 8´2")	1.1 - 3.0 m (3´3" - 10')	Others sizes available on request.
Perimeter walkway width:	1.1 - 2.5 m (3´3" - 8´2")	1.1 - 2.5 m (3´3" - 8'2")	Others sizes available on request.
Suitable for shipping into 40" containers:	Yes	Yes	On request.
Driveable (Forklift):	No	Yes	On request.
Deck type:	2 or 3mm stamped plate, 32x5 or 38x5 serrated vertical grating	2 or 3mm stamped plate, 32x5 or 38x5 serrated vertical grating	Others design on request.
Main beam sizes:	80x40x5mm up to 200x70x6mm	150x50x5mm up to 200x70x6mm	
Hinge bushing:	35mm (1 3/8") - 45mm (1 3/4")	35mm (1 3/8") - 45mm (1 3/4")	Available in both moulded rubber or nylon type.
Cage configuration layout:	Single or double string	Single or double string	
Floats available - standard:	Yes	Yes	Rotational moulded PE or blowing PE (Colors under request).
Floats available - increased volum:	Yes	Yes	Rotational moulded polyethylene (Colors under request).
Floats filled with expanded polystyrene and sealed for added safety:	Yes	Yes	
Ralling height:	1000mm (39,7")	1000mm (39,7")	Others sizes available on request.
Ralling net hooks included:	Yes (Pointed up, down or both)	Yes (Pointed up, down or both)	
Post options for:	Predator net, bird net, Lifting.	Predator net, bird net, Lifting.	On request.
Others accesories:	On request	On request	Please inquire.
Hot dipped galvanizing:	Yes	Yes	

Wavemaster Steel Cages in Scotland.

wavemaster™

Mooring Systems

Safer mooring with low cage point loading

Extra safe and strong mooring solutions

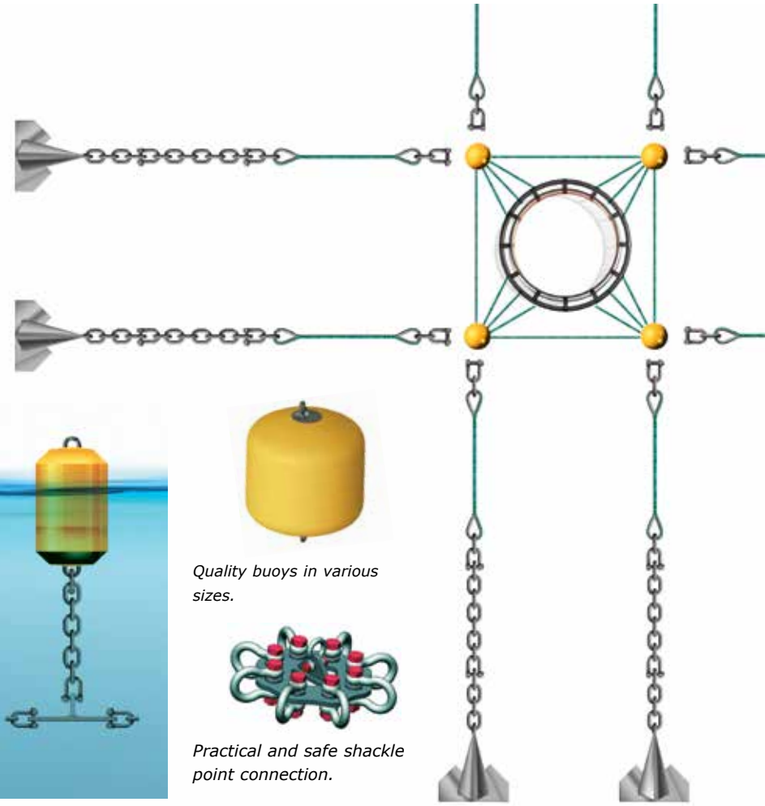
We are introducing a new and innovative mooring connector system that simplifies the mooring process and improves the structural strength of the cage when moored at the site. All anchoring connections and components are NS9415 certified. (Norwegian Standard 9415).

The new Polarcirkel anchoring connector eliminates most of the weak points typical of steel brackets: Corrosion, damage to work boats, sideways jamming of brackets, chafe on floating pipes, need for chafe sleeves, point loading floating pipes, bending connection lugs, icing loads etc.

Experienced crew and certified mooring solutions.

Anchoring of Polarcirkel cages outside Lofoten in the North of Norway.

Our mooring systems have been tested in rough weather conditions worldwide.



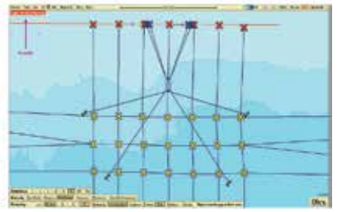
Quality buoys in various sizes.

Practical and safe shackle point connection.

All ropes are connected to the mooring plate well below propeller depth, gives safe transport aroiund the cage. mainly use of rope close to the cage prevents damage to the nets.

A wide range of anchors, depending on depth and bottom conditions. All steel components used near or under the surface are hot dip galvanized.

The bouys are made of rotation moulded polyethylen filled with polystyrene foam. This retain full floating capasity even if the shell has been damaged.



A typical mooring design showing grid, anchors, buoys and barge locations etc. This design allows for for custom positioning to the farm site.

Akvasmart Mort Collection concept

Eductor pump principle
The compressed air is injected through a number of small holes in a separate air chamber. The benefits obtained by the stream of injected air entered through many holes, is to create a constant and rapid flow.

Automatic system for collecting morts

- A prerequisite for a healthy and vibrant fish environment

A basis for a continued healthy environment for the live fish in the system is that all morts are removed as soon as possible from the cage.

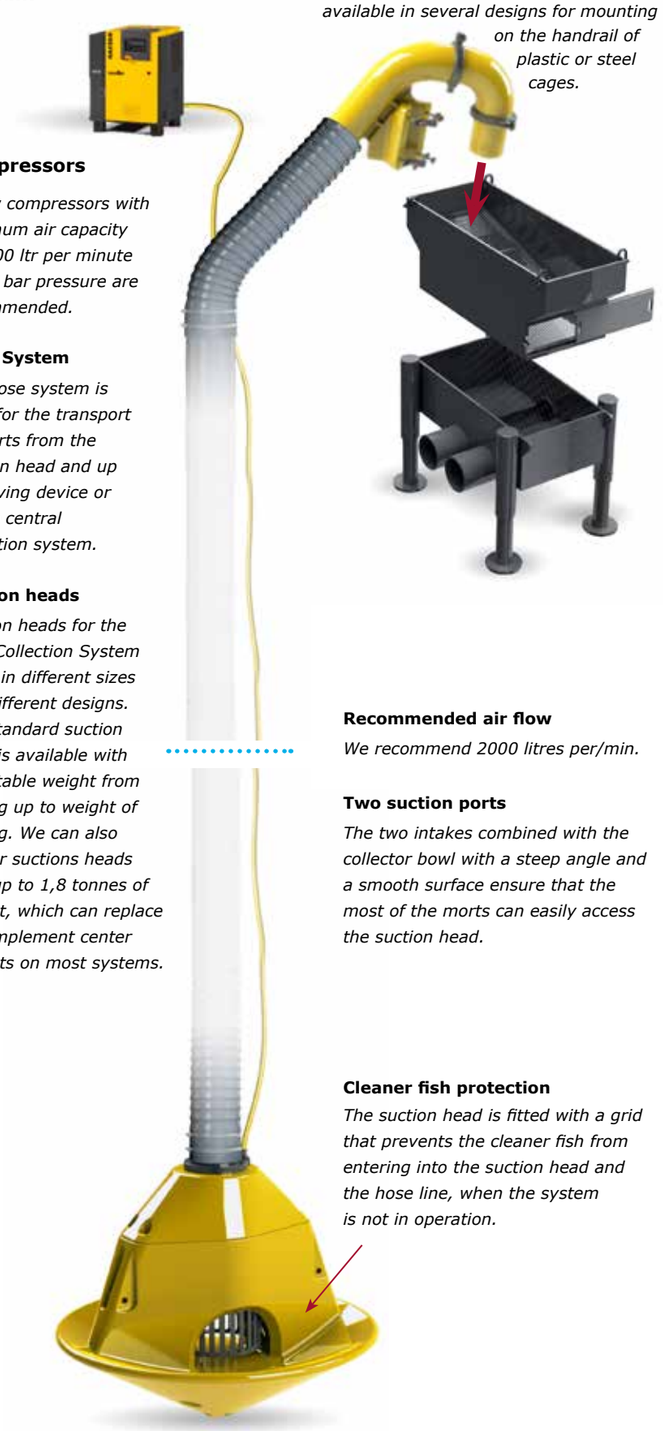
Most feed barges from AKVA group have integrated silage tanks in the hull below the feed selector valves.

AKVA group, HSE and several fish farming companies has developed an automated, robust and very practical system for removing morts. The system is adapted to today's Polarcirkel plastic cages, Wavemaster steel cages, nets and various other site infrastructure solutions.

The Akvasmart mort system is offered as semi-open or as a fully closed system. The system can be delivered with central collection where the fish goes right from the cages for further treatment.

A wide range of sieve designs can be mounted on a work boat or at the site, or integrated into a central collection unit, depending on the farmers demand for mort collection infrastructure.

The automatic Mort Collection System:



Compressors

Screw compressors with minimum air capacity of 2000 ltr per minute and 7 bar pressure are recommended.

Hose System

The hose system is used for the transport of morts from the suction head and up to sieving device or to the central collection system.

Suction heads

Suction heads for the Mort Collection System come in different sizes and different designs. Our standard suction head is available with adjustable weight from 200 kg up to weight of 700 kg. We can also deliver suctions heads with up to 1,8 tonnes of weight, which can replace or complement center weights on most systems.

Handrail protection

Tube and handrail protectors are available in several designs for mounting on the handrail of plastic or steel cages.

Recommended air flow

We recommend 2000 litres per/min.

Two suction ports

The two intakes combined with the collector bowl with a steep angle and a smooth surface ensure that the most of the morts can easily access the suction head.

Cleaner fish protection

The suction head is fitted with a grid that prevents the cleaner fish from entering into the suction head and the hose line, when the system is not in operation.

akvasmart™

Cage Nets

The highest quality nets safeguards your fish

AKVA group offer several types of nets for your cages. Both traditional and proven fiber nets (mainly nylon) made by Egersund Net in Norway, as well as the innovative and promising non-fiber EcoNets (solid PET wire), made by the Italian company Maccaferri.

As the net is the only barrier keeping your valuable farmed fish inside and predators outside, it is the most critical piece of equipment on a cage farm that prevents fish escapes and other fish losses. Consequently, only the highest quality and design must be used, combined with Norwegian Standard (NS9415) certification.
In order to ensure correct net specifications for your farm site, documented site environmental loads from currents, waves and wind must be used for dimensioning and design. This must be followed by professional and systematic inspection, maintenance and testing throughout the life span of the net.

The end result is a net you can trust, whether fiber or non-fiber materials.

Fibre Nets from Egersund Net

All nets are pre-treated with primer to ensure optimal and long-lasting protection of nets and ropes.

Egersund Net - top of the line for more than 40 years

One of world´s leading net and net service suppliers

Egersund Net has developed into one of Europe's leading suppliers of fish farming nets and net services.

These quality nets are based on years of experience with the safety of our customers at heart.

Egersund fibre nets are designed for a wide range of round and square cage sizes.

Net testing and research

Egersund Net invests heavily into R&D to ensure leading edge net products and new concepts. Including material testing, net shape designs, net weight concepts and new anti-fouling treatment methods. Extensive scale testing is performed at SINTEF's large tank testing facility in Hirtshals, Denmark, in order to determine optimum performance in various current and wave conditions. The end result is a powerful combination of high-tech modern R&D with decades of personal craftsmanship and practical experience.

An efficient manufacturing line with a highly qualified and experienced staff.

Construction and design

It is very important to ensure the nets are easy and safe to handle. A good user manual as well as clear marking of lifting points facilitate safe and secure handling. The risk of escape is thereby reduced.

The new ENCA (Egersund Net Circle Angled) net design is an example of a design which facilitates easier/ faster and safer net handling.

New dedicated database for documentation of net, floating and mooring components developed by Egersund Net.

New advanced 3D software is used to develop optimum net designs by simulating scenarios.

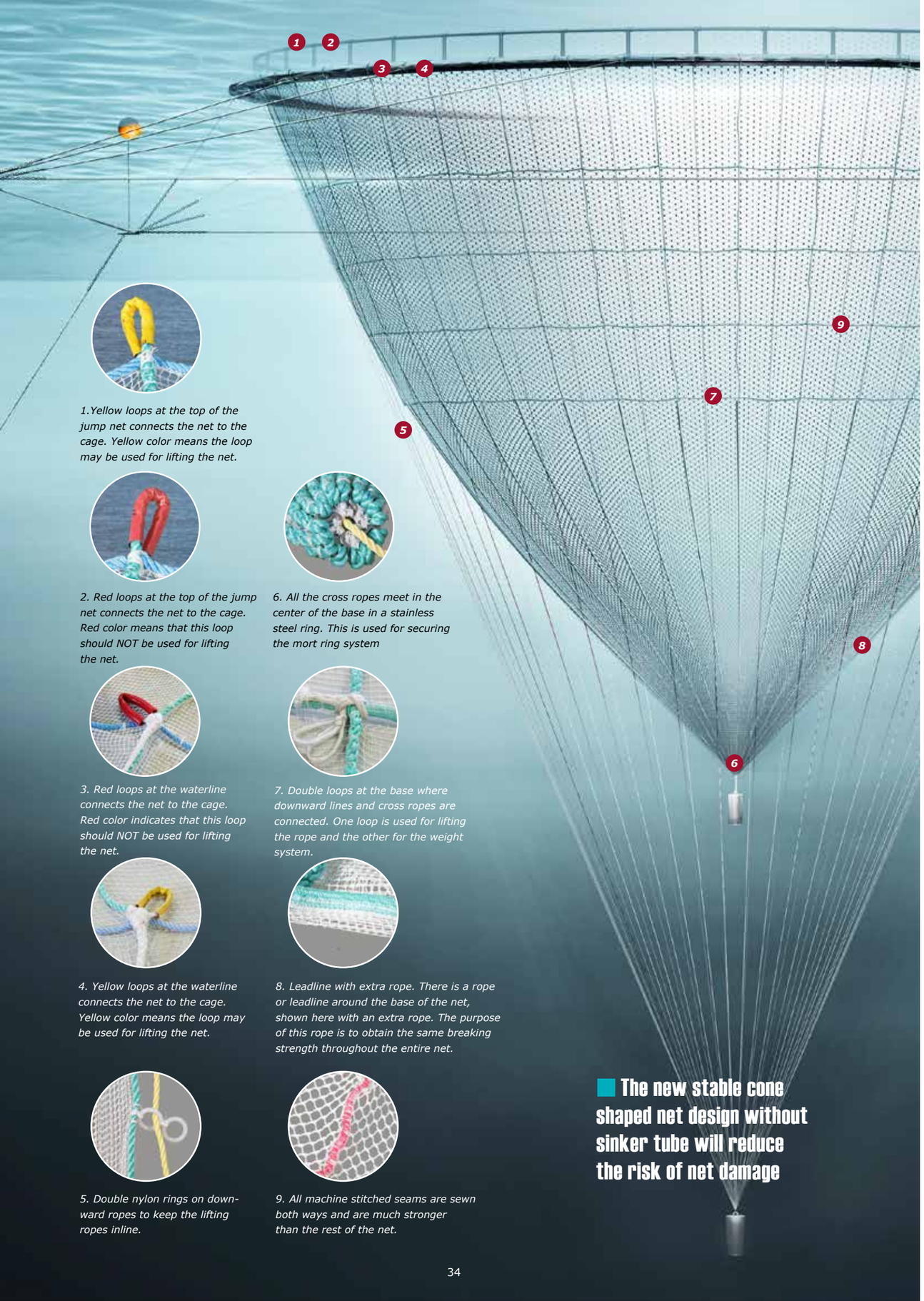
Quality control and ISO certification

Egersund Net supplies nets with both square and hexagonal mesh made of high quality materials at the modern plant in Egersund. A stringent quality assurance program ensures a high quality manufacturing process. They supply knotless net, super knotless net and Dyneema net materials. The entire net fabrication process is ISO 9001 certified by Det Norske Veritas (DNV) and NS9415.

The three main fibre net designs are: Standard knotless netting, Super netting and Hexagonal netting in nylon.

All new models are tested under different current conditions at SINTEF's research tank facility in Hirtshals, Denmark.

Testing of the new cone-shaped model without a sinker tube proved that it was structually stable even at current speeds in excess of 2 knots.



1.Yellow loops at the top of the jump net connects the net to the cage. Yellow color means the loop may be used for lifting the net.

2. Red loops at the top of the jump net connects the net to the cage. Red color means that this loop should NOT be used for lifting the net.

6. All the cross ropes meet in the center of the base in a stainless steel ring. This is used for securing the mort ring system

3. Red loops at the waterline connects the net to the cage. Red color indicates that this loop should NOT be used for lifting the net.

7. Double loops at the base where downward lines and cross ropes are connected. One loop is used for lifting the rope and the other for the weight system.

4. Yellow loops at the waterline connects the net to the cage. Yellow color means the loop may be used for lifting the net.

8. Leadline with extra rope. There is a rope or leadline around the base of the net, shown here with an extra rope. The purpose of this rope is to obtain the same breaking strength throughout the entire net.

5. Double nylon rings on downward ropes to keep the lifting ropes inline.

9. All machine stitched seams are sewn both ways and are much stronger than the rest of the net.

The new stable cone shaped net design without sinker tube will reduce the risk of net damage

Advanced net load calculations

Loops for proper connection of nets and bottom ropes

All connection loops are color coded to ensure that it will be easy for operators to ensure they lift the net using the correct loops and ropes. The loops have been lab tested in Egersund Nets' lab to document the horizontal and vertical forces acting on them.

The loops are fitted in such a way that a failure will not result in net damage. It is also easy to replace worn out loops when the net is serviced.

The bird nets are offered in standard sizes or tailor made on request for each farm.

Net materials

Customized cage nets and bird nets are available for a wide range of fish farming installations.

Nylon

Special knotless netting made from nylon ensures high quality netting with a long lifespan. Such netting is available in various thread and mesh sizes. Color: Black or green.

Dyneema

Cage nets made of knotless Dyneema are lighter in weight and have better water flow properties than regular nylon nets.
Color: White.

The service package includes cleaning of nets, inspection, repair and anti-fouling/ abrasion protection. (Some areas only)

Service and documentation

Egersund Net provides services for the fish farming industry from their modern facilitiesin Norway and Turkey. Emphasis. on high quality and environmentally friendly products and services ensures high capacity installations adapted to the needs of our customers.

All nets are quality assured and fabricated to stringent quality requirements. All fabrication at Egersund Net is ISO 9001 and NS 9415 certified.

Anti-fouling

Advanced anti-fouling technology ensures optimum antifouling effectiveness, product safety, environmental friendliness and HSE. Coating without use of antifouling agents is also available. The coating helps protect the nets from UV radiation, makes cleaning of the nets easier and increases the life-span of the nets.

The nets are lifted safely during harvesting and cleaning. We also supply sweep nets for all types of cages.

All nets are shipped on a pallet or in a big bag. This makes it simple and safe to install them in the cage.

Proven and thoroughly tested knot solutions in different colors make it easier to locate the correct lifting point.

A wide range of special design nets are available, including saithe nets, bird nets, harvest nets for both round and square cages.

High durability and escape prevention

- **High durability**
- **Escape prevention**
- **No net changes**
- **Maximized water flow**
- **No anti-fouling paint**

The unique **Polarcirkel EcoNet** concept can totally change today's fish farming! This non fibre net technology has been used to make over 4000 fish farming nets, in addition to many other usages including shark nets, rock slide nets etc.

EcoNet is used as shark nets as protection outside popular beaches.

The real strength of the EcoNet is well tested when used as rock slide nets!

The EcoNet is made from very strong but light weight PET and has some superior characteristics, including:
Being virtually escape proof, predator proof and has a long lifespan.
The non-fibre wire has very hard surface that resists marine fouling and makes it easy to clean in the water using Idema Net Cleaners.
No use of antifouling paints or ongoing net changes.

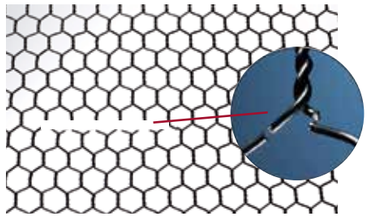
EcoNet is handled in very similar ways to a nylon net, including drying up the net for crowding fish during harvest.

Fish escaping through holes in the net accounts for most of reported cases.

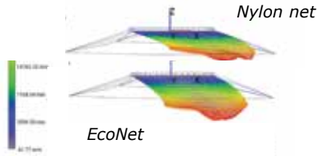
Fish farm net deformation and loads are affected by three main factors: CURRENTS + NET TYPE (rigidity, drag, strength) + NET WEIGHTS.

The semi-rigid structure keeps the net shape intact to maximize water flow and oxygen to the fish.

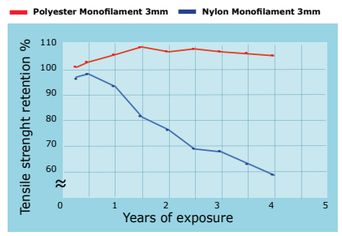
The unique semi-rigid and low-drag EcoNets maintain a superior net shape in strong currents compared to conventional nets, thus providing optimum water flow and oxygen levels for your fish. Less net weights are then required to keep EcoNets in place. The result is reduced deformation/drag, reduced risk of net chafe/damage and reduced overall displacement (weight) of the entire cage system. This means less load on the mooring systems and more reserve buoyancy for the cages.



A 20 cm cut in an EcoNet will tend to stay closed due to the double twisted thermo formed semi-rigid structure and non-tearing weaving.



Example of cages in 0.5 knots current (0.25 m/sec.). The EcoNet will still keep a very good and stable shape.



The PET netting wire retains high tensile strength for decades below and above water.

Less resistance and higher stiffness = reduced mooring loads, increased net volume and more oxygen!

Extreme weather

Predators

Mechanical damage

Biological deterioration

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Extra strong long-life Polarcirkel EcoNets

Polarcirkel EcoNet can be hooked onto the railing net hooks when dried up.

The floating collar is the component of the fish farming cage that supports the entire weight and loads of the entire EcoNet (not the railing).

The EcoNets can be delivered in tailor made sizes.

The net are connected to the sinker tube using rope loops.

The bottom of the nets are normally cone shaped to simplify removal of morts. (See page 28.)

Easy to install - easy to keep clean

The upper section of the EcoNets have slightly tapered vertical walls with a 1m jump-net up top and the bottom is normally cone shaped.

Polarcirkel EcoNet being installed by use of cranes and skilled farm technicians.

For shorter periods, Polarcirkel EcoNet can be hooked onto the railing net hooks when dried up.

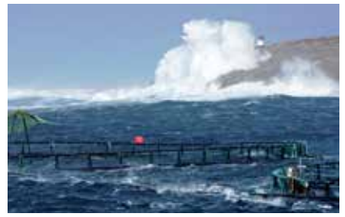
The EcoNet tolerates icing and the ice is also easier to remove compared to other net materials.

Approved for fishfarming use according to Norwegian Standard 9415.

Once the Polarcirkel EcoNet is installed in the cage there is no need to disconnect it during normal operations. Exceptions will be in case of net damage. The EcoNets are cleaned in the water and are not taken out for cleaning or antifouling. This greatly reduces the risk of net damage as a result of net handling.

Net handling and fish husbandry

Although Polarcirkel EcoNet is a semi-rigid net, it can still be handled in very similar ways to a nylon net. This includes drying up the net for crowding fish during harvest, fastening the net to the cages and attaching sinker tubes etc. However, as the EcoNet is being tested and used in new markets and for new species, new and better techniques will continue to be developed to simplify net handling and ensure the best possible fish husbandry.

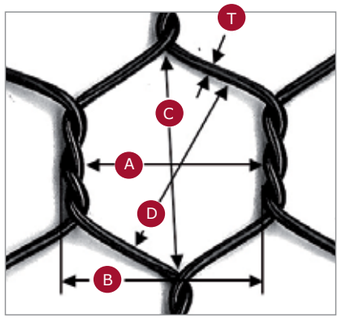


The Polarcirkel EcoNets are made for rough, daily use, from very strong but light weight PET.

Strong but light material

The shape of the EcoNet wire mesh is designed to remain intact if a single wire is cut. This means the mesh will remain relatively stable and the shape intact with minimum negative effect of the strength of the net cage structure.

The Polarcirkel EcoNet is made from very strong but light weight PET, (Polyethylene Terephthalate).



A = Mesh width
B = Mesh pitch
C = Mesh height
D = Mesh diagonal
T = Wire thickness

The hard non-fibre wire reduce settling of marine fouling and makes the net easy to clean with a net cleaner from AKVA group.

Polarcirkel EcoNet is available in two different mesh sizes:

Mesh size:	t (mm)	A (mm)	B (mm)	C (mm)	D (mm)	weight
Large:	3,0	45	50	71	59	590g/m²
Small:	2,5	35	40	43	37	570g/m²

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Quick and easy cleaning of floating pipes and sinker tubes

Akvasmart Cage Cleaning system is easily operated by one person. The complete cleaning process is performed safely with people standing well away from the operation.

Effective high pressure cage cleaning

A standard version of Akvasmart Cage Cleaner is equipped with a high pressure washer for floating pipes with two rings.

All Akvasmart Cage Cleaners are designed with rugged, galvanised and coated steel profiles.

The washing unit can easily be mounted at the stern of a workboat or feeding boat.

A special designed hook for the crane will simplify the handling of the sinking tubes in the cages.

Regular cage cleaning ensures stable cage weight and reduces the risk of infection in the cages.

The Akvasmart Cage Cleaner is developed to simplify and streamline the cleaning and removal of marine fouling. The washing unit can easily be mounted at the stern of a workboat. The Cage Cleaning system consists of a lifting unit, a submersible part and a hydraulical driving wheel system that rotates the cage while it is being flushed and cleaned.

For cages without sinker tubes, the cleaner is submerged below the floating pipes. The unit is placed with the inner pipe connected to the drive rolls while the outer pipe is positioned against the sliding surface and steering rolls. The Cage Cleaner can also be delivered with a system for flushing sinker tubes where the sinker tube and floating pipes are cleaned simultaneously. It is generally enough to rotate the cage one turn to ensure proper cleaning.

An effective and well proven concept

The cleaning unit hydraulically lifts a part of the cage above the surface and the flushing occurs when the cage is rotated around it´s own axis, while a pressure washer mounted on rotating arms performs the cleaning using water under high pressure.

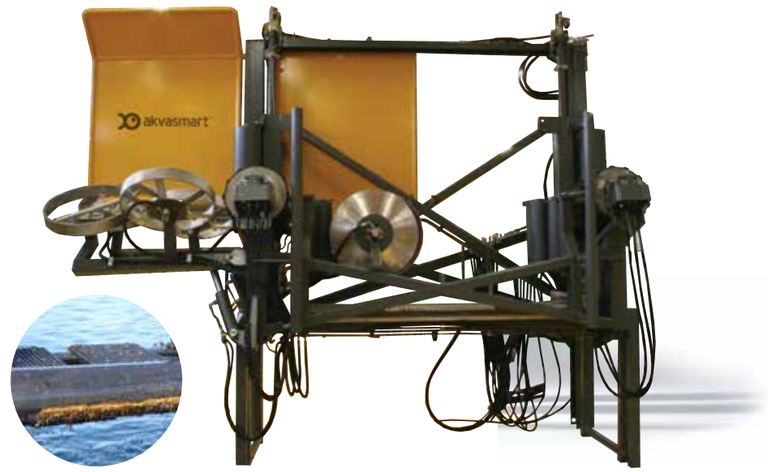
Installation and use

Connection points are included for the stern of the workboat. Dedicated work platforms can also be offered to simplify the access inspection and maintenance. The whole cleaning process occurs without any people close to the cage and can be operated by one single man in a workboat.

Specifications:

- Size: L:4946mm. H:3993mm. W:2450mm + 540mm in telescope
- Weight: Approx. 3000 kgs (without sinking tube cleaner)
- Surface treated steel profiles (galvanised and coated)
- Rotation speed while flushing: Approx. 4m/min
- The cleaners are hydraulical adjustable and it´s possible to clean pipes in various widths for example; Polarcirkel 160m 500 pipe 190cm or Polarcirkel 160m 450 pipe 150cm.

The Cage Cleaning Systems are developed in close cooperation with large aquaculture companies and are produced by SMV Hydraulic as.



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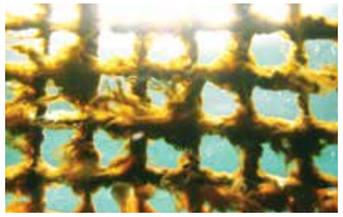
Net Cleaning Systems

Effective Net Cleaning ensures optimum oxygen levels and faster growth

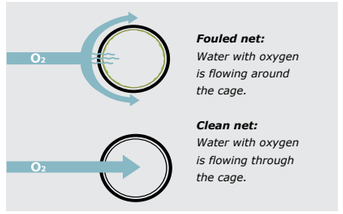
Idema Net Cleaners were launched in 1987, and are today renowned for quality, high performance and their ease of use. The first Net Cleaners had single 30cm diameter cleaning discs, operated from the cage edge using a shaft. Underwater pressure washing of cages containing fish has become even more common as the requirements to environmentally friendly aquaculture in larger cages provides the best scale of economics.

With this in mind we have developed and improved the Net Cleaners and can now present the best range of net cleaners and high pressure pumps ever. This combination offers you the most efficient cleaning system suited for all types and sizes of cages.

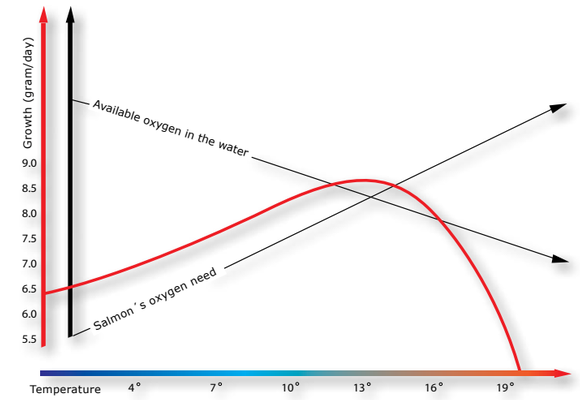
Reduced marine fouling improves the environmental conditions



Strong marine fouling on the net will reduce the oxygen supply. Algae growth can increase bacterial loads and cause diseases and stress in the biomass.



It is proven that increased marine fouling leads to reduced water flow. As a result, the oxygen rich water will mostly flow around the cage.



Growth curve for salmon

Good waterflow through the nets are crucial at high water temperatures.

Growth
Temperature

The growth curve is almost identical for most aquaculture species such as; trout, cod, halibut, sea bass and sea bream.

It is important to keep the weight of the cages light in cold periods. Icing and fouling can indirectly cause breakdowns and serious damage.

Idema Net Cleaners also keep nets clean in tropical waters, as here in Thailand.

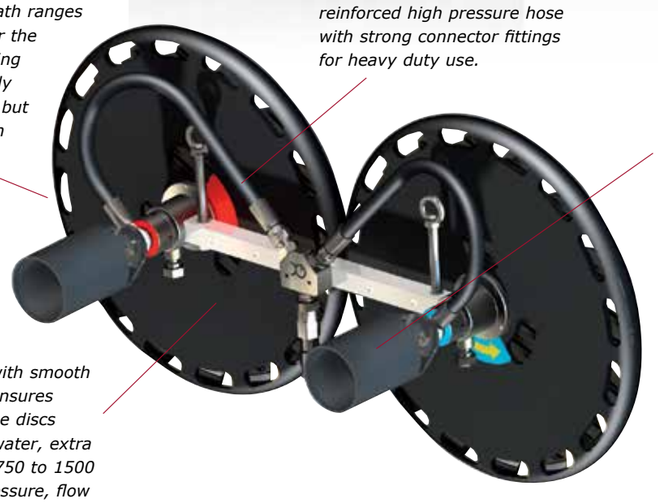
Environmentally friendly and flexible solutions

In Net Cleaning, filtered high pressure sea water is used to remove marine fouling on the nets. Idema Net Cleaners use rotating cleaning discs mounted on support frames in various shapes and combinations. We use rugged, tailor-made high-pressure pumps to drive the cleaning discs. The cleaning process starts with submerging the frame on the inside of the net, using only sea water under high pressure. Idema cleaning systems do not use chemicals or scrubbing action making them environmentally friendly while ensuring minimal wear on the nets.

The Heavy Duty center bearing with silicium-carbide pressure housing mean less service calls and minimal down time.

The width of the cleaning path ranges from 80cm, up to 290cm for the largest model using 7 washing discs. The discs are generally delivered in 40cm diameter but can also be ordered in 30cm or 50cm diameter.

Extra strong 2-layer steel reinforced high pressure hose with strong connector fittings for heavy duty use.



The new water jet thrusters creates a significantly better push against net. It is available as an option on all new systems, or as an upgrade-kit for already delivered net cleaners.

Heavy duty cleaning discs with smooth front rail in stainless steel ensures minimal wear of the net. The discs have low resistance in the water, extra high rotation speed - from 750 to 1500 rpm depending of water pressure, flow rate and cleaning disc diameter.

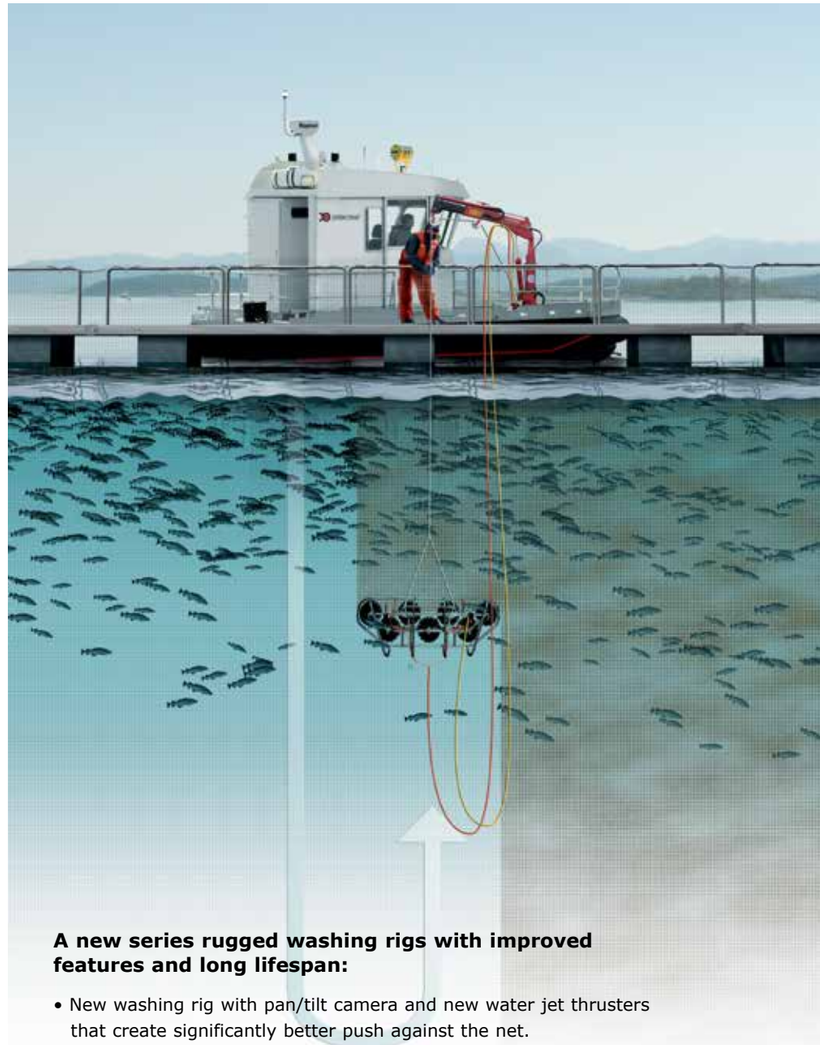
- a wide range of Net Cleaners

The large Net Cleaners can be operated in automatic mode by two persons using a crane, winch, cap stand or as a integrated option on ROV (Remotely Operated Vehicle). The smallest Net Cleaners can easily be operated from the cage by a single person.

One of the new models is the net cleaner, an effective 7 disc washing rig with a stainless steel protective net guard.

Video camera control

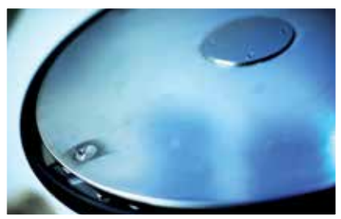
On the larger Idema frames we offer tailor-made camera and video systems that provide a full overview, and the possibility to inspect the nets.



A new series rugged washing rigs with improved features and long lifespan:

- New washing rig with pan/tilt camera and new water jet thrusters that create significantly better push against the net.
- Stainless shock absorbers reduce vibrations and water pressure hammering in connections and pipes.
- Large integrated particle filter included.

A camera installed directly on the net cleaner will send you clear video images that can be saved for later inspection and documentation.



All Net Cleaners are offered with smooth front discs in stainless steel that ensure minimal wear of the net.

The environmental conditions in the cages are the most vital parameters for top quality and faster biomass growth.

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Net Cleaning Specifications

High Pressure Washers:	F-Drive K-28-280-SB	D-Drive K-28-250-SD	D-Drive K-136-300-SD	D-Drive K-188-300-SD-JD	D-Drive K-240-280-SD-JD
Engine:	Vanguard V-Twin	HATZ 2G40	John Deere	John Deere	John Deere
Max hp:	22hp	22hp	150hp	150hp	150hp
Size:	120x60x75cm	120x80x80cm	400x200x200cm	400x200x200cm	400x200x200cm
Weight:	80kg	180kg	approx. 2300kg	approx. 2400kg	approx. 2400kg
Fuel:	Gasoline	Diesel	Diesel	Diesel	Diesel
Max cleaning discs:	2	2	8	10	10
Recommended cage circumference:	Up to 90 meter	Up to 90 meter	Up to 200 meter	Up to 200 meter	Up to 200 meter
Standard equipment:	40m high pressure hose, 3m suction hose, power nozzle with 40cm extension and swivel coupling.	Delivered on a stainless steel frame in Euro pallet size with lifting lugs.	Delivered with sound proof cabinet and integrated pump.	Delivered with stainless steel sound proof cabinet and integrated pump.	Delivered with stainless steel sound proof cabinet and integrated pump.
Water, liter/min:	28	28	136	188	240
Bar:	280	250	300	300	280

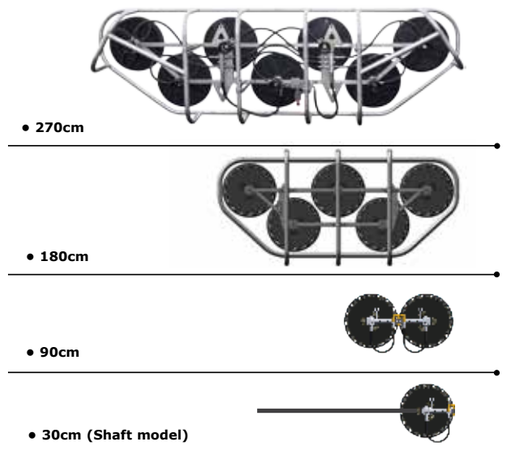
High Pressure Washers:	H-Drive K-28-280-SH	H-Drive K-30-200-SH	H-Drive K-41-210-SH	H-Drive K-136-300-H	H-Drive K-188-300-H
Engine:	Fitted to workboat	Fitted to workboat	Fitted to workboat	Fitted to workboat	Fitted to workboat
Max hp:					
Size:	60x35x25cm	60x35x25cm	60x45x25cm	113x73x52cm	113x73x52cm
Weight:	40kg	40kg	40kg	350kg	350kg
Fuel:	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic
Max cleaning discs:	2	2	2	8	8
Recommended cage circumference:	Up to 90 meter	Up to 200 meter	Up to 90 meter	Up to 200 meter	Up to 200 meter
Standard equipment:	Integrated pump	Integrated pump	Integrated pump	As stand alone unit or dedicated water supply.	As stand alone unit or dedicated water supply.
Water, liter/min:	28	30	41	136	188
Bar:	280	200	210	300	300

GASOLINE DRIVE
DIESEL DRIVE
HYDRAULIC DRIVE

The cleaning discs are generally delivered with 40cm diameter. They can also be offered in 30cm or 50cm diameter.

New improved and corrosion free MVN pumps from Prattisoli with extra long life-span.

WASHING AREA (WIDTH) **FRAMES**



Gasoline, diesel or hydraulic driven High Pressure Washers

We offer a rugged series of High Pressure Washers for seawater, suited to various system solutions and cage sizes. The gasoline driven washers (F-Drive), are light-weight and perfect as portable units. The diesel driven units (D-Drive), are almost maintenance free, use less fuel than the gasoline models and are well suited for large, powerful, permanent installations. The hydraulic driven high pressure models (H-Drive), are small, compact and almost maintenance free, perfect for below deck installations in workboats.

Net Cleaning system solutions

The table above presents a range of effective Net Cleaning frames for different cage constructions and sizes. The high pressure pumps can be driven by gasoline, diesel or hydraulics, depending on the best solution for your farm. Heavy Duty Cleaning discs with smooth frames in stainless steel ensure minimal wear on the net. Additional benefits include low drag in the water and extra high rotation speed, from 750 to 1500 rpm.

- **Stainless steel cabinet with hydraulic winch and remote control for raising and sinking the washing rig.**
- **New corrosion free pumps with extra long life-span.**
- **Dedicated pre-feeder pump boosts water flow.**
- **Hydraulic driven hose reel for 100m ¾ hose.**

Diesel (D-Drive) 2-10 cleaning discs
Idema K-188-300-SD-JD-150
Size 400x200x200cm. Cleaning discs: 5+5.

Hydraulical (H-Drive) 2-8 cleaning discs
Idema K-30-200-SH
Size: 60x35x25cm.
Cleaning discs: 2.

Gasoline (F-Drive) 2 cleaning discs
Idema K-28-280-SB-VA-22
Size: 120X60x75 cm.
Cleaning discs: 2.

Workboats

Designed for extreme conditions

The robust workboats offers great design, quality build, unique flexibility, user-friendliness and low maintenance. More than 2000 boats are in use in fish farming, marine industry, gas/oil industry, emergency services, military, arctic tour operators and pleasure boaters who need an indestructible boat.

All AKVA group boats are tested in extreme weather conditions all over the world. All models are loaded with smart details and unique features for safe operation in tough conditions and we ensure our products have an emphasis on safety and the environment.

Polarcirkel Open Workboats

Virtually maintenance free and unsinkable

These robust Open Workboats offers great design, quality build, unique flexibility, user-friendliness and low maintenance. Polarcirkel RBBs (Rigid Buoyancy Boats) are self-bailing, in contrast to a conventional RIB, and have rigid pontoons filled with polystyrene. Combined with 21° V-shaped hull, this design makes a virtually unsinkable boat with unique stability and excellent seaworthiness.

We offer Polarcirkel Open workboats with outboards in sizes from 5,85 up to 8,45 meters. The inboard series ranges from 6,85 to 8,45 meters.

All Polarcirkel boats are tested in extreme conditions all over the world. They are loaded with smart details and unique features for safe operation in tough conditions, with emphasis on safety and the environment. The PE-100 plastic is LNG-based with great recycling properties.

The 685, 785 and 845 models are offered with new hull design, which gives better lift, and forces the spray out to the sides. These improvements provides better seaworthiness and and a more comfortable ride.

Polarcirkel has flexible model solutions, such as Polarcirkel Sport, with removable cockpit canvas for windy or rainy days.

Open Workboats, standard equipment:

- 4 pcs mooring cleats
- Extra protective hull strips
- Stowage space with hatch
- Manual bilge pump
- Self-bailing deck
- Red gunwales
- Fire extinguisher
- Non-skid rubber deck mat outside
- Red PE rub rail on pontoons
- Built-in steps in aft pontoons
- Hydraulic steering wheel
- CE approved, category C

Inboard only:

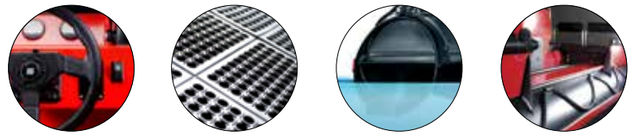
- Dashboard mounted controls
- Electric bilge pump with sensor
- Battery, main switch & ignition lock
- Insulated engine hatch with pneumatic lifters
- Built-in diesel tanks 2 x 220 litres or 1 x 310 litres
- RPM gauge, temperature gauge, oil pressure gauge, voltmeter and tilt indicator
- Steering console with instrumentation and antenna arch with nav-lights

Outboard only:

- 4 x lifting eyes
- Step boards
- Fuel tank: 103L (560) or 210L (685, 785 and 845)
- Fuel gauge
- Battery compartment under bench
- Guard rails around bench
- Seat with stowage space

Optional equipment:
Search lights, work lights, antenna arch, bow platform with pulpits, marine electronics, etc.

Open Workboats	560	685	785	845
Lenght (LOA):	560cm (18'5")	685cm (21' 8")	785cm (25'8)	845cm (27'7")
Beam (BOA):	207cm (6' 9")	248cm (8' 2")	271cm (8' 10")	271cm (8' 10")
Displacement:	750kg/1650 lbs	950kg/2090 lbs	1250kg/2750 lbs	1375kg/3025 lbs
Max HP:	100HP	250HP	300HP	350HP
Recommended HP:	From 60HP	From 100HP	From 115HP	From 150HP
Max load:	1000kg/2200 lbs	1250kg/2760 lbs	2250kg/4960 lbs	2250kg/4960 lbs
Max persons:	10	10	12	12
Shaft:	Long	X-Long	X-Long	X-Long/Ultra long
V-bottom :	21°	21°	21°	21°
Inboard engine:	Not available	Available	Available	Available
Water Jet:	Not available	Not available	Available	Available



Hydraulic steering wheel, self-bailing deck, sloping pontoons with integrated steps and smart options like hinged gunwale.

We deliver tailor made workboats for professional users such as, fish farming coast guard, navy, police, fire department, tour operators etc.

The boats have performed exceptionally well in arctic and tropical regions and can handle temperatures from -40°C to +55°C.

Polarcirkel Cabin Workboats

New bow and hull design provides better seaworthiness and less sea spray.

Customized to suit your needs

AKVA group´s tough and reliable hand-crafted Polarcirkel Cabin Workboats benefit from great design values, high quality build, unique flexibility and extremely low maintenance. Polarcirkel RBBs (Rigid Buoyancy Boats) are self-bailing, in contrast to a conventional RIB (Rigid Inflatable Boat), have rigid pontoons filled with polystyrene for ultimate safety.

Polarcirkel Workboats are offered in three versions with inboard engines from 130hp to 435hp and lengths of 7.85, 8.45 and 9.10 meters.

New hull design

The Polarcirkel Cabin 785 and 845 models have a new and improved bow design. The bow is raised with 25cm. The bow has been raised 25cm to improve ride comfort and reduce spray.

Cabin Workboats, standard equipment:

- 4 pcs mooring cleats
- Extra protective hull strips
- Stowage space with hatch in bow
- Manual bilge pump
- Self-bailing deck
- Red gunwales
- Fire extinguisher
- Hydraulic steering wheel
- Dashboard mounted controls
- Electric bilge pump with sensor
- Insulated engine hatch with pneumatic lifters
- Battery, main switch & ignition lock
- Insulated cabin
- 3-passenger bench seat
- RPM gauge, temperature gauge, oil pressure gauge, voltmeter and tilt indicator
- Built-in diesel tanks 2 x 220 litres
- Head available on the 910 model
- Non-skid rubber deck mat outside
- Red PE rub rail on pontoons
- Built-in steps in aft pontoons
- CE approved, category C

Optional equipment:
Search lights, work ligths, hydraulic installation, capstan, bow platform with pulpits, marine electronics, etc.

New bow and hull design.

Volvo Penta inboard turbo-diesels from 130hp to 435hp and hydraulic steering wheel. Useful options like hydraulic winch and search lights.

Cabin Workboats, inboard	785	845	910
Length (LOA):	785cm (25,8')	845cm (27,7')	910cm (30")
Beam (BOA):	270cm (9')	270cm (9')	300cm (10')
Displacement:	2400kg/5290 lbs	2600kg/5730 lbs	3600kg/7940 lbs
Max Hp:	260hp	310hp	435hp
Recommended HPS:	From 225hp	From 225hp	From 370hp
Max load:	1600kg/3530 lbs	1400kg/3090 lbs	1400kg/3090 lbs
Max persons:	5	5	5
Material, Polyethylene:	12mm	12mm	15mm
Shaft (Outboard versions):	X-long	X-long	–
V-bottom 21°:	•	•	•

Polarcirkel Cabin Workboat can also be delivered in a popular outboard version. A smart solution with large deck space.

The models have a comfortable cabin and can be equipped with cage control monitors and advanced software.

Polarcirkel RBB hulls are self-bailing and have rigid pontoons filled with polystyrene that makes them virtually unsinkable.

polarcirkel™

Polarcirkel 1050

New model with double sloping pontoons

New smart work boat concept

AKVA group has developed a new prototype for a larger cabin boat. This boat is based on an entirely new concept. The boat has double buoyancy pontoons manufactured from 500 mm PE tubing. The hull is approximately identical to our other boats, featuring a 21° V-bottom, however, this model has 3 pressure-tested chambers. This ensures very good buoyancy.

The new Polarcirkel 1050 model is a tailor made workplace with many practical solutions and smart details.

The new 1050 model can be offered with an inboard motor with drive propulsion, inboard motor with water jet, or ordinary outboard motors. The cabin boat can also be delivered with twin motors.

The prototype has been equipped with two 265 hp motors, and the boat has a maximum speed of around 40 knots. Window wipers are installed for all front windows. A number of useful details are included, such as stainless steels shackles, lots of cabin space, slanted stern tube with incorporated steps and comfortable padded seats.

The prototype has also been equipped with an external control position for the helmsman, rescue net, map plotter, Raymarine radar and bow propeller.

Polarcirkel 1050 standard equipment:

- Bow propeller 6hp, continuously variable
- Manual bilge pump
- Electric bilge pump with sensor
- Self-bailing deck
- Hydraulic steering with servo assisted steering wheel
- Motor installation includes battery, cabling, main power switch
- Built-in fuel tanks, 630 litres
- Built-in steps in aft pontoons
- Pulpits
- Insulated motor hatch with pneumatic lifters
- Stowage space in bow
- Step mouldings
- Material: aluminium
- 14 windows, sliding windows for captain and helmsman
- Ladder to roof (mounted on rear side)
- 3 window wipers for front windows
- 4 adjustable chairs with padding
- Passenger bench on starboard side and stowage space under bench
- 6 Spotlighs (LED) in ceiling
- Exit on rear side. (Libra door)
- Mast with lanterns on roof
- Dashboard with motor control instruments, navigation equipment, etc.
- 2 cupholders
- Control handles mounted on top of dashboard
- Two 12V sockets in dashboard
- Fire extinguisher
- Large stowage space under forward pulpit (A toilet can be installed here)
- Rescue door in pulpit. Libra door.
- Defroster 10 KW
- Railing along roof and walls
- Stowage net on rear side of seat
- Compass

The Polarcirkel 1050 models have got new spacious cabins with entrance aft and emergency exit at the front. Both pilot and co-pilot have sliding windows.

Polarcirkel 1050	
Length (LOA):	1050cm (32´)
Beam (BOA)	350cm (11´)
Displacement:	5.700kg
Max hp:	40 knots
Max persons:	8
V-bottom :	21°
Material, hull:	PE 100
Cabin:	Aluminum 1,9x4,2m
Pontoons:	Double, 0,5m Ø filled with polystyrene
Construction:	Buttwelded hull with 3 water proof bulkheads

The new 1050-series has well arranged dashboard. All antennas, radars o.e. are mounted on the roof and are easy available with an aft ladder. Exterior steering position can also be installed.

Polarcirkel 1050 can also be offered with other engin alternatives, here´s a version with two inboard motors and drive.

The boat is equipped with a large cabin type walk-around. Inside the cabin, there are four padded seats and a large bench seating three persons.

AKVAcat 1350/750 Workboats

Designed for excellent performance

AKVAcat is designet to create the optimal working conditions and is a perfect choice for demanding fish farmers. Excellent comfort, elegant design, lots of power and enough space provides the best fasilities you can disire. The workboats are seaworthy and manufactured in accordance with DNV – Nordic boat standard. AKVAcat is offered with seawater resistant aluminum type 6060/6083.

The new AKVAcat models are tailor-made for aquaculture.

Excellent quality in every detail

Fully insulated engine room provides better working conditions and fully upholstered inside gunwales makes cleaning and disinfection much easier. Welded construction provides extra strength and the wide hull ensures high stability and buoyancy. The workboats have excellent finish both exterior and inside.

Powerfull hydraulic cranes

AKVAcat is equipped with a Palfinger 32080G (M) crane with remote control and marine upgrading. The crane is CE certified and driven by a hydraulic aggregate connected to the engin.

AKVAcat Workboats, standard equipment:

Capstan:
2 capstans of 3 and 5 tons can be delivered as standard equipment. Emergency stop is also included.

Navigation and communication:
- Radar and chart plotter with integrated GPS: Furuno
- VHF radio: Furuno
- Sonar: Furuno FCV
- Autopilot: Furuno Navpilot

Generator:
230W/30 kW, 3 fase

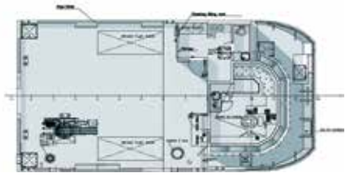
Engine:
Engine: John Deere 6090 SFM75 M2, 275kw @2200 rpm (375hp)

Gearbox: Twin Disc MGX-5114A

Bow thruster:
SP 550 HYD bow thruster will be mounted on port side

Other:
- Extra helm behind the wheelhouse
- Liferaft for 6 men
- Fire extinguisher

Hydraulics:
Driven by 2 PTO Parker pumps 105ccm supplying common hydraulic system for all hydraulic users.



All AKVAcat models are manufactured in accordance with DNV – Nordic standard.

AKVAcat	1350/750
Length (LOA):	13.50m
Beam (BOA):	7.50m
Beam hull:	2.10m
Depth:	2.50m
Displacement:	max. 30.000kgs
Oil tanks:	4 x 2000 litres
Water tanks:	1 x 2000 litres
Max hp without cargo:	13 - 15 knots
Plate thickness:	5-7mm

Stylish wheel house equipped with a selection of avanced maritim electronics. Soft, comfortable and adjustable seats.

A certified hydraulic Palfinger PK crane with a 3.5 ton winch with remote control.

AKVAcat workboats have large loading capacity and they are often used as service and supply boats offshore.

AKVAcat 1499/1000

King of the sea!

AKVAcat 1499/1000 is the largest and best best equipped workboat in our product line. Excellent comfort, elegant design, lots of power and enough space provides the best fasilities you can disire. The workboats are seaworthy and manufactured in accordance with DNV – Nordic boat standard. AKVAcat is offered with seawater resistant aluminum type 6060/6083.

AKVAcat workboats have large loading capacity and they are often used as service and supply boats offshore.

Excellent quality in every detail

Fully insulated engine room provides better working conditions and fully upholstered inside gunwales makes cleaning and disinfection much easier. Welded construction provides extra strength and the wide hull ensures high stability and buoyancy. The workboats have excellent finish both exterior and inside.

Powerfull hydraulic crane

The model is offered with a Palfinger PK 50002 G (M) crane, connected to a 3,5 ton winch with remote and marine upgrading. The crane is CE certified and driven by a hydraulic aggregate on the engine.

Stylish wheel house equipped with a selection of avanced maritim electronics. Soft, comfortable and adjustable seats.

AKVAcat Workboats, standard equipment:

Capstan:
4 capstans of 1, 1, 3 and 8 tons can be delivered as standard. Foot pedals and emergency stop are also included.

Navigation and communication:
- Radar and chart plotter with integrated GPS: Furuno
- VHF radio: Furuno
- Sonar: Furuno FCV
- Autopilot: Furuno Navpilot

Generator:
230V/30 kW, 3 fase

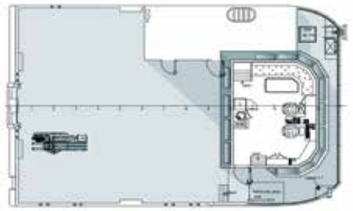
Engine:
Engine: John Deere 13,5 litres 575hp, 6135SFM75
M3 @2000 RPM (575hp)

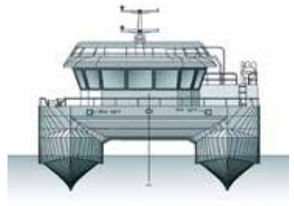
Gearbox: Twin Disc MGX-5114A

Bow thruster:
Two bow thrusters of 50hp will be be mounted on port side

Other:
- Extra helm by the crane or behind the wheelhouse
- Liferaft for 6 men
- Fire extinguisher

Hydraulics:
Driven by 2 PTO Parker pumps 105ccm supplying common hydraulic system for all hydraulic users.





All AKVAcat models are manufactured in accordance with DNV – Nordic standard.

AKVAcat	1499/1000
Length (LOA):	14.99m
Beam (BOA):	10.00m
Beam hull:	2.90m
Depth:	2.50m
Displacement:	max. 40.000kgs
Oil tanks:	4 x 2000 litres
Water tanks:	1 x 2000 litres
Max hp without cargo:	13 - 15 knots
Plate thickness:	5-7mm

A certified hydraulic Palfinger PK crane with a 3.5 ton winch with remote control.

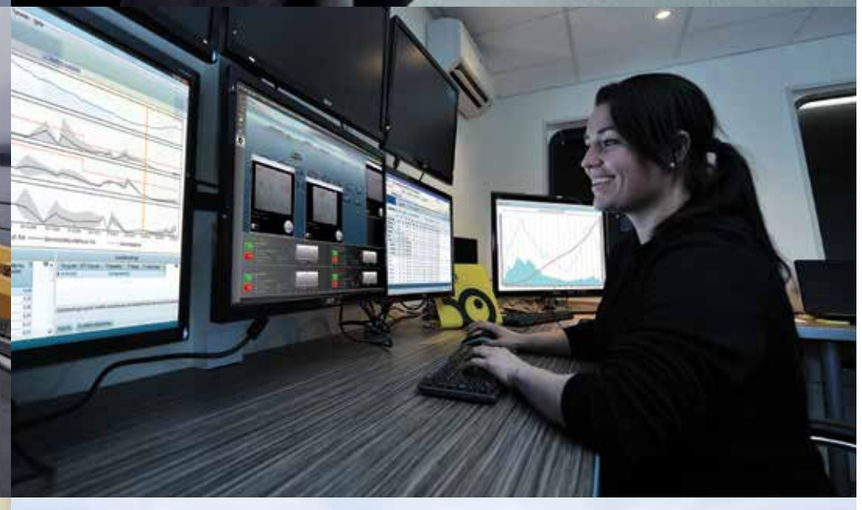
A fully insulated engine room with a stainless steel deck. The main engine is a John Deere 13,5 liter with 575 hp.

Feed Barges

AKVA group is the world’s leading supplier with decades of experience and with close to 300 barges delivered world wide.

The latest models provide true scale of economics efficiencies to a wide range of cage farming operations with sizes ranging from 96 to 850 metric tons. They include the latest innovations in FEED CARE OPTIMIZED and efficient feed handling, storage, logistics and personnel comforts to ensure a functional and safe farm base for your crew.

AKVA group has feed barges suitable for a wide range of sites and climates, including inshore, offshore, arctic and tropical areas. All barges are delivered complete, fully self contained with Akvasmart CCS Feed Systems, generator(s), control room, living quarters, safety equipment and all other optional equipment installed, such as integrated mort silage systems, camera- and sensor systems.



Wavemaster Feed Barges

The main purpose for a feed barge is to provide the most efficient and reliable feed system for your farming operations. The second purpose is to provide a safe and seaworthy barge that can withstand the forces of nature at your farmbase site.

Each individual barge model has been optimized to ensure the lowest possible cost compared to size of barge. As a result, the AKVA group Feed Barges are the most cost efficient barges on the market with no material or space wasted.

Tailormade quality barges for a wide range of sites and climates.

Up to 24 feed silos

AKVA group is the world´s leading supplierof feed barges with decades of experience and a wide range of high quality models up to 850 mtons.

Full overview and control

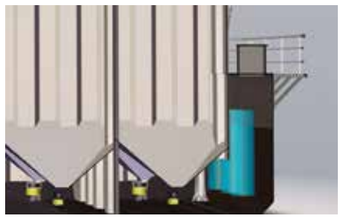
The control room is the heart of the feed barge. This is where the operator has all the information available and controls the entire feeding process.

Just like home

Modern feed barges today are becoming a main work place with proper facilities, living areas and entertainment centers.

Designed for rough conditions

The feed barges are constructed to withstand heavy weather. They are tested in demanding arctic conditions in the north of Norway.



Integrated silage tanks

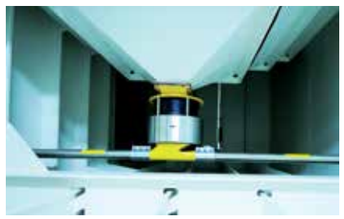
The mort silage tanks are integrated inthe hull below the feed selector valves. This is the most effective silage system in the marked today.

Flexible crane solutions

Cranes of high quality and different sizes can easily be installed on the barges.

Reliable feed system

The central feed system concept was invented by AKVA group in 1980 and CCS is today the most popular and reliable system world wide.



Gentle feed handling

Custom designed feed doser valves transfer the feed into the air flow. Air control ensures gentle feed handling.

Sound proof machine room

A big machine room with sound proofing makes the maintenance easier, and leaves room for more equipment.

wavemaster™

Up to 850 tons and 16 parallel feed lines

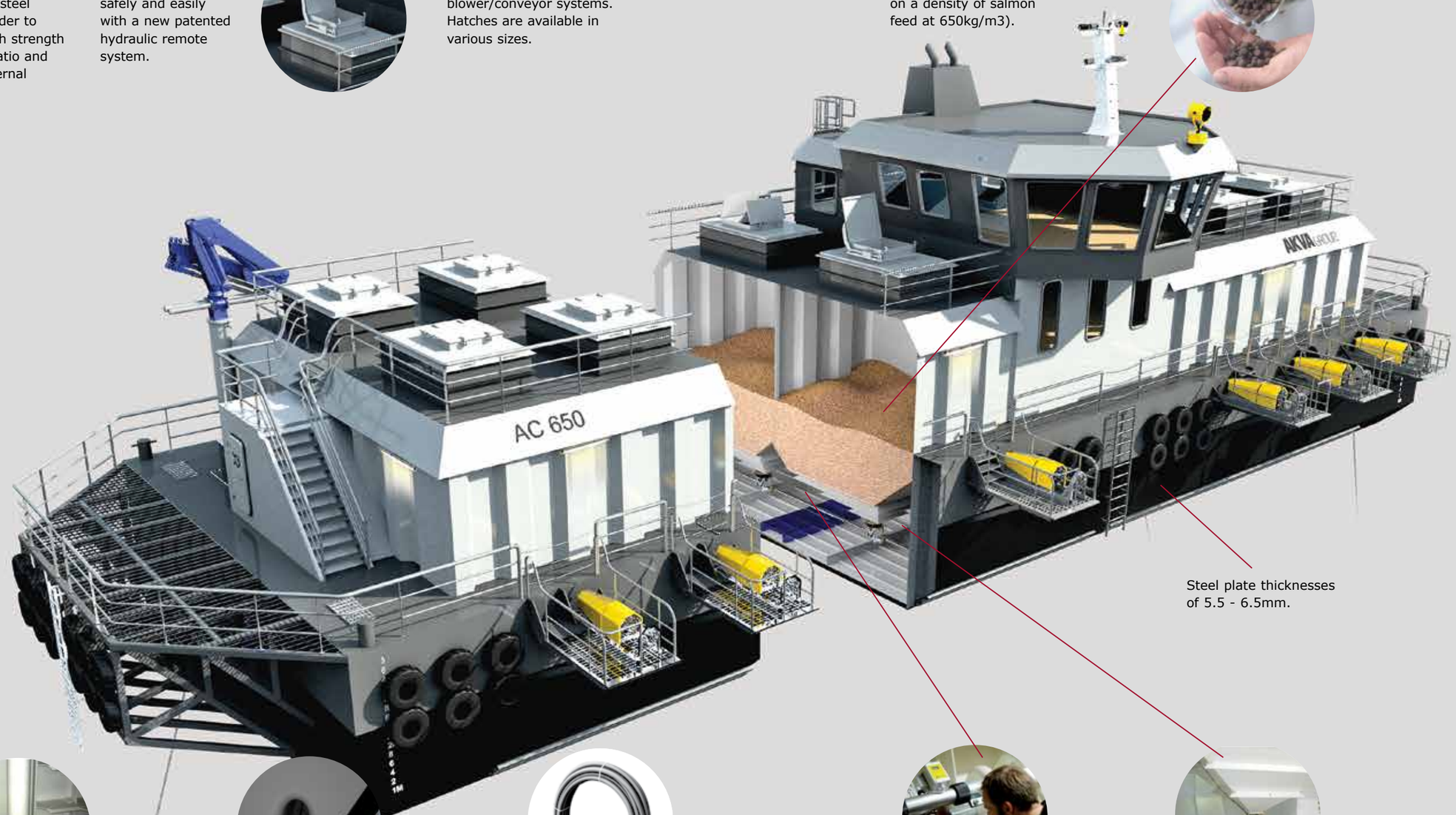
The silo sections are often made with corrugated steel plates in order to achieve high strength to weight ratio and smooth internal surfaces.

The new automatic silo hatches will open safely and easily with a new patented hydraulic remote system.

The feed is loaded into the silos using either bulk bags or bulk blower/conveyor systems. Hatches are available in various sizes.

The feed storage capacity in each silo range from 15-75 metric tons (based on a density of salmon feed at 650kg/m3).

In addition to the required safety gear onboard, most Wavemaster feed barges also include water intrusion and fire alarm systems.



Steel plate thicknesses of 5.5 - 6.5mm.

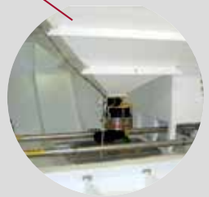
Metallization of outer surface above water line is an option to decrease maintenance and increase life-span.

Heavy duty internal mooring pipes with flared bottom openings. Oversized to allow for two anchor chains in each pipe.

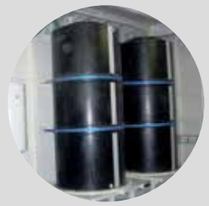
Reinforced bottom ”trumpet” mooring pipes distributes loads and prevents chain being snagged during tightening.

High quality and durable Polarcirkel feed pipes in coil lenghts up to 1000 metres.

Air control system allows for real time measurement of airflow, back-pressure and temperature ensuring optimum feed handling.

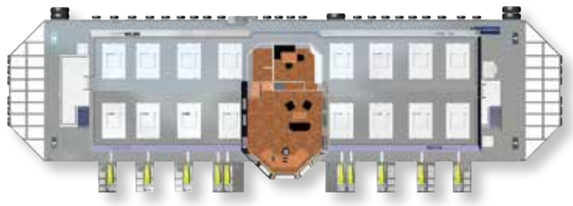


Subject to local safety regulations, most barges include 3-5 watertight bulkheads with two automatic bilgepumps in each.

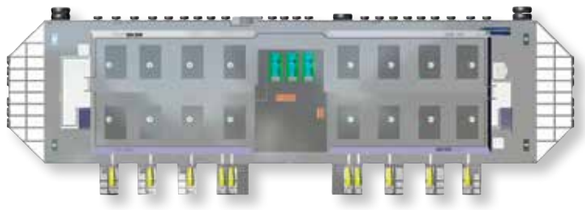


Most barges are supplied with large fuel tank(s), freshwater tank, hot water tank, sewer tank and optional integrated mort silage tank(s).

AC 850 Panorama



Control room and silo deck level

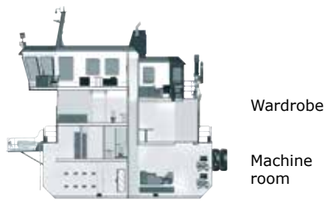


Main deck level

AC 850 Panorama features

- Feeding capacity up to 4 x Quattro System (16 x lines).
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Design & comfort are key interior features.
- Panorama provides the view control of the silos and the cages.
- Suitable accomodation perfect for long stays onboard.
- Spaceous engine room prepared for the advanced power management system.
- Metallized above waterline to ensure high quality corrosion protection.
- 5 years paint warranty.
- Integrated mort grinding tank system.

Capacity	
Feed storage capacity:	850 tons (16 silos)
Silage:	Up to 60 tons
Fuel Oil:	Up to 24 tons
Fresh water:	Up to 8m³
Sewage:	Up to 3m³
Main Dimentions	
Length (ex. platforms):	44,6m
Beam:	12m
Hull height:	4,0m
Minimum freeboard:	1,391m



Control room and living room

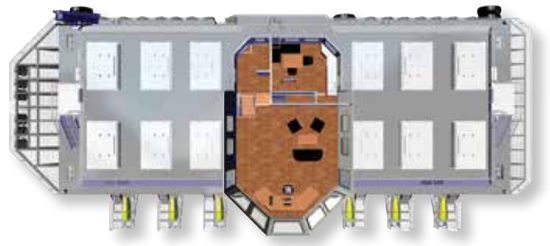
Cabin level

Deck level Storage/ Workshop

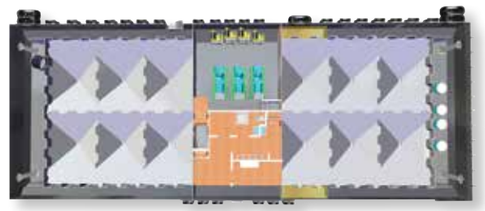
Wardrobe

Machine room

AC 650 Panorama



Control room and silo deck level

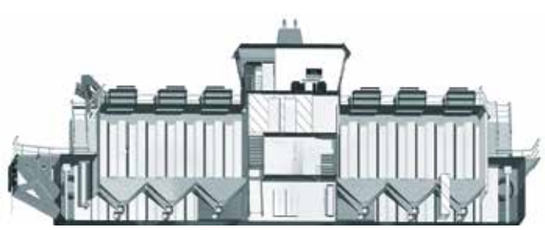


Main deck level

AC 650 Panorama features

- Feeding capacity up to 3 x Quattro System (12 x lines).
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Design & comfort are key interior features.
- Panorama provides the view control of the silos and the cages.
- Suitable accomodation perfect for long stays onboard.
- Spaceous engine room prepared for the advanced power management system.
- Metallized above waterline to ensure high quality corrosion protection.
- 5 years paint warranty.
- Integrated mort grinding tank system.

Capacity	
Feed storage capacity:	650 tons (12 silos)
Silage:	Up to 60 tons
Fuel Oil:	Up to 24 tons
Fresh water:	Up to 8m³
Sewage:	Up to 3m³
Main Dimentions	
Length (ex. platforms):	31,3m
Beam:	12m
Hull height:	4,0m
Minimum freeboard:	1,233m



Control room and living room

Cabin level

Deck level Storage/ Workshop

Wardrobe

Machine room

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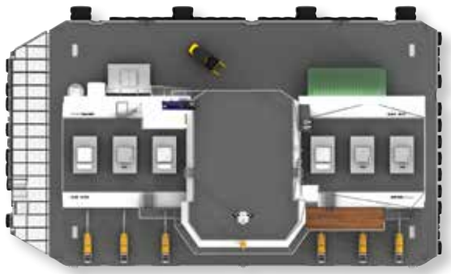
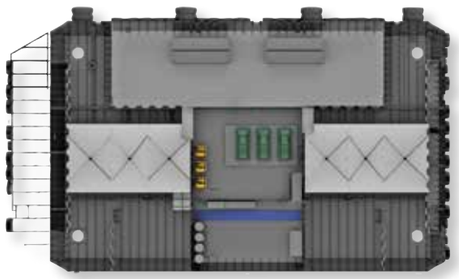
AB 450 Comfort



Silo deck level

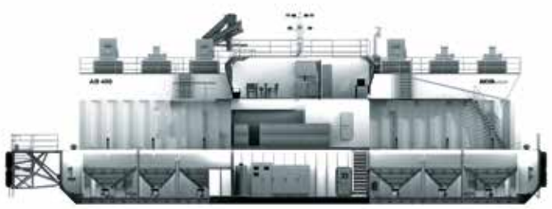


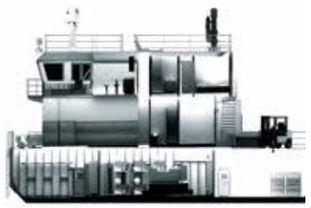
Main deck level

AB 450 Comfort features

- Feeding capacity Hexa System - 6 silos, 75 ton each
- Big storage room under main deck up to 100 m²
- Working area on main deck up to 80m²
- Spaceous engine room prepared for the advanced power management system
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Design & comfort are key interior features.
- Great stability features.
- Large crane capacity located on the mid barge.
- Metallized above waterline to ensure high quality corrosion protection.
- Five years paint warranty
- Integrated mort grinding tank system.

Capacitiy	
Feed storage capacity:	450 tons (6 silos)
Silage:	Up to 50 tons
Fuel Oil:	Up to 36 tons
Fresh water:	Up to 6m³
Sewage:	Up to 5m³
Main Dimentions	
Length (ex. platforms):	30m
Beam:	19m
Hull height:	3,3m
Minimum freeboard:	1,210m





Control room and living room
Cabin level
Deck level Storage/ Workshop

Gallery
Wardrobe
Machine room

AC 450 Panorama

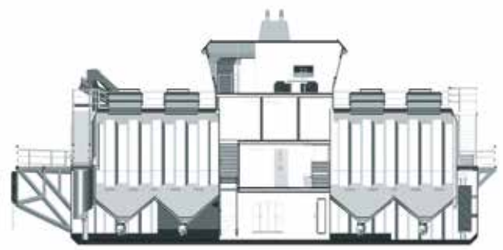
Control room and silo deck level

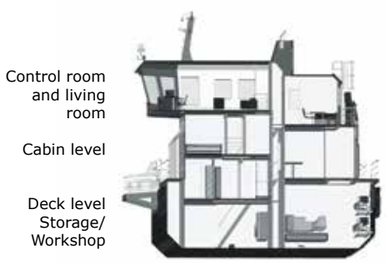
Living quarters, wardrobes, silos

AC 450 Panorama features

- Feeding capacity up to 2 x Quattro System (8 x lines).
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Design & comfort are key interior features.
- Panorama provides the view of the silos and the cages.
- Suitable accomodation perfect for long stays onboard.
- Spaceous engine room prepared for the advanced power management system.
- Metallized above waterline to ensure high quality corrosion protection..
- 5 years paint warranty.
- Integrated mort grinding tank system.

Capacitiy	
Feed storage capacity:	450 tons (8 silos)
Silage:	Up to 50 tons
Fuel Oil:	Up to 30 tons
Fresh water:	Up to 6m³
Sewage:	Up to 5m³
Main Dimentions	
Length (ex. platforms):	22m
Beam:	12m
Hull height:	4,0m
Minimum freeboard:	1,074m





Control room and living room
Cabin level
Deck level Storage/ Workshop

Gallery
Wardrobe
Machine room

wavemaster™

AC 350 Comfort

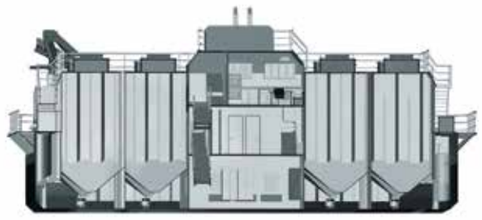
Control room and silo deck level

Living quarters, wardrobes, silos

AC 350 Comfort - features:

- Feed capacity dimensioned based on customer needs.
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Design & comfort are key interior features.
- Spaceous engine room prepared for the advanced power management system.
- Metallized above waterline to ensure high quality corrosion protection..
- 5 years paint warranty.
- Integrated mort grinding tank system

Capacity	
Feed capacity:	350 tons (8 silos)
Ensilage:	Up to 50 tons
Diesel tank:	Up to 30 tons
Freshwater tank:	Up to 6m³
Sewage:	Up to 5m³
Main Dimentions	
Length (ex platforms):	22m
Breadth:	10m
Depth till main deck:	4,0m
Minimum freeboard:	1,074m



Control room and living quarters

Cabin level/ Deck level

Storage/ Workshop

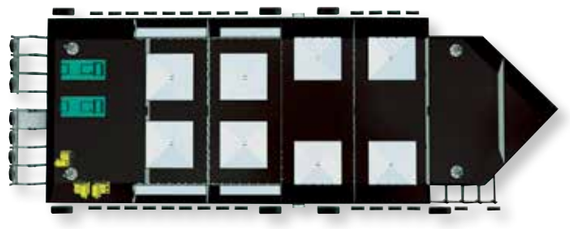
Gallery

Wardrobe

Machine room

AM 320 Comfort

Control room and silo deck level



Machine room, silos, aft deck

AM 320 Comfort - features:

- Feed capacity dimensioned based on customer needs.
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Spaceous engine room prepared for the most demanding power management system.
- Comfort model's raised control room, provides full view control over the silos and the cages.
- Design & comfort are key interior features.
- Metallized above main deck to ensure high quality protection against sea conditions
- 5 years warranty on all painted surfaces.
- Hull integrated mill tank of high processing capacity.
- Large deck with high loading capacity pr. m².

Capacity	
Feed capacity:	320 tons (8 silos)
Silage:	Up to 40 tons
Diesel tank:	Up to 30 tons
Freshwater tank:	Up to 8m³
Sewage:	Up to 5m³
Main Dimentions	
Length (ex platforms):	28,4m
Bream:	10m
Hull height:	3,5m
Minimum freeboard:	1,182m

Control room and living quarters

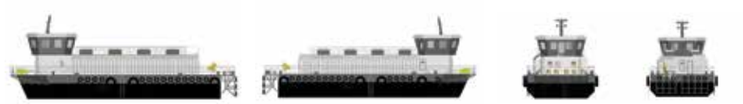
Cabin level/ Deck level

Storage/ Workshop

Gallery

Wardrobes

Machine room



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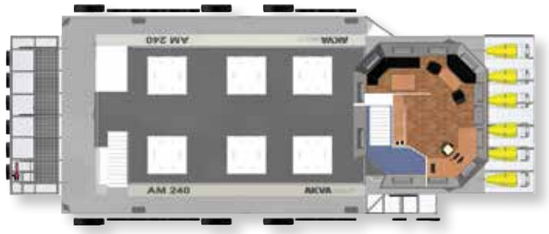
AM 240 Classic



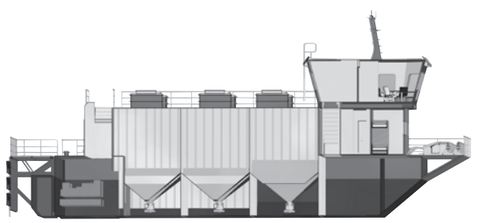
Control room and silo deck level

Machine room, silos aft deck

AM 240 Classic - features:

- Feed capacity dimensioned based on customer needs.
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Spaceous engine room prepared for the advanced power management system.
- Metallized above waterline to ensure high quality corrosion protection.
- 5 years paint warranty.
- Hull integrated mill tank of high processing capacity.
- Large deck with high loading capacity pr. m^2.

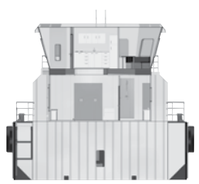
Capacity	
Feed capacity:	240 tons (6 silos)
Silage:	Up to 30 tons
Diesel tank:	Up to 30 tons
Freshwater tank:	Up to $4m^3$
Sewage:	Up to $5m^3$
Main Dimentions	
Length (ex platforms):	21,5m
Breadth:	10m
Hull height:	3,5m
Minimum freeboard:	1,065m



Control room and living quarters

Cabin level/ Deck level

Storage/ Workshop

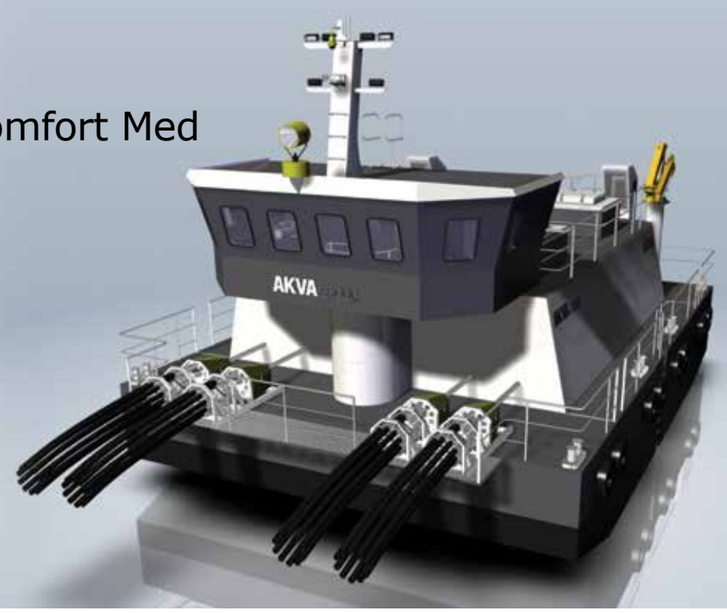


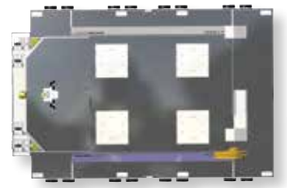
Gallery

Wardrobes

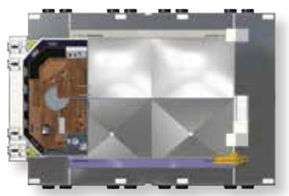
Machine room

AJ 130 Comfort Med





Silo deck



Control room, living quarters, silos

AJ 130 Comfort Med - features:

- Feeding capacity dimensioned based on customer needs.
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Comfort model's raised control room, provides full view control over the silos and ther cages.
- 5 years paint warranty.

Capacity	
Feed capacity:	130 tons (4 silos)
Silage:	-
Diesel tank:	Up to 11 tons
Freshwater tank:	Up to $2m^3$
Sewage:	Up to $2m^3$
Main Dimentions	
Length (ex platforms):	14,5m
Beam:	10m
Hull height:	2,5m
Minimum freeboard:	0,947m

Control room and living quarters

Deck level Storage

Gallery

Machine Room

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AJ 96 Classic

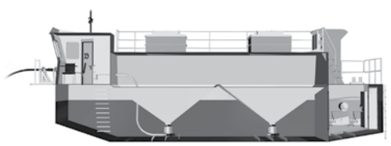
Silo deck

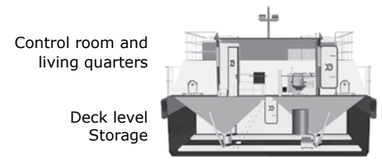
Control room, living quarters, silos

AJ 96 Classic - features:

- Feed capacity dimensioned based on customer needs.
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Spaceous engine room prepared for the most demanding power management system.
- 5 years paint warranty.

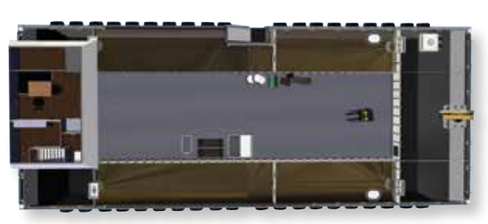
Capacity	
Feed capacity:	96 tons (4 silos)
Silage:	-
Diesel tank:	Up to 5,5 tons
Freshwater tank:	Up to 2m³
Sewage:	Up to 2m³
Main Dimentions	
Length (ex platforms):	14,5m
Beam:	8m
Hull height:	2,2m
Minimum freeboard:	0,947m





AWB 50 Work Barge

Control room, living quarters, deck area



Machine room, storage

AWB 50 Work Barge - features:

- Deck area of 17x5m designed for optimal cargo handling and operations.
- Dimensioned to withstand up to 4,5m significant wave height (Hs).
- Accomodation of 6.5x4m, with living room, kitchen, toilet and garage available areas.
- Metallized above waterline to ensure high quality corrosion protection.
- 5 years paint warranty.
- Max cargo capacity up to 100 tons (including deck cargo, excluding ensilage)

Capacity	
Feed capacity:	50 tons
Silage:	Up to 125 tons
Diesel tank:	1 cubic meter
Freshwater tank:	Up to 125 tonn
Sewage:	1m³
Main Dimentions	
Length (ex platforms):	25m
Beam:	10m
Hull height:	2,2m
Minimum freeboard:	1,000m

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Wavemaster Feed Barges - Specifications

Model:	AC 850	AC 650	AB 450	AC 450	AC 350	AM 320	AM 240	AM 160	AJ 130 Med	AJ 96	AWB 50	Comments:
Feed capacity												
Loading capacity - feed (tons):	850	650	450	450	350	320	240	160	130	96	50 (on deck)	Based on density of 650kg/m³
Loading capacity - feed (m3):	1420	1050	715	715	579	495	405	260	210	155	No silos	***
Number of silos:	16	12	6-8	8	8	8	6	4	4	4		
Barge spesifications												
Length - total (LOA) excl. platform m:	44,6	31,3	30	22	22	28,35	21,5	17,5	14,5	14,5	25,0	***
Beam - total (BOA) m:	12	12	19	12	10	10	10	10	10	8	10	***
Hull height (m):	4	4	3,3	4	4	3,5	3,5	3,5	2,5	2,5	2,2	***
Water proof sections:	5	5	4	5	5	4	4	4	3	3	3	Subject to applicable regulations
Min. freeboard Hs >=3m, stand. mooring:	1,391	1,233	1,0210	1,074	1,074	1,182	1,065	0,998	0,947	0,947	1,125	Hs = Significant wave height
Min. freeboard Hs >=3m, cross mooring:	1,591	1,4	1,315	1,24	1,074	1,382	1,267	1,165	1,114	1,195		
Deck house - options available:	Panorama	Panorama	Comfort	Panorama/Comfort	Comfort/Panorama	Comfort/Classic	Comfort/Classic	Comfort/Classic	Comfort/Classic	Classic		
Veterinary/divers room possible:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	* Optional diver´s room
Biosecure zones:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	***
Max number of generators:	3+1 small	3+1 small	3+1 small	3+1 small	3	3+1 small	2+1 small	2+1 small	2	1	1	
Diesel tank, construction:	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	***
Diesel tank capacity (m3):	2x25	2x12	1x36	2x12.5	2x15	2x11.75	2x11.5	2x11.5	5,5-11	5,5	5,5	***
Freshwater tank, construction:	PE	PE	PE	PE	PE	PE	PE	PE	PE/GRP	PE/GRP	PE/GRP	***
Freshwater tank, capacity (m3):	2-8	2-8	2-6	2-6	2-6	2-8	2-4	2-4	1-2	1-2	1-2	***
Sewage, construction	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	***
Sewage tank, capacity (m3):	3-5	3	3-5	3-5	3-5	3-5	3-5	3-5	1-2	1-2	1-2	***
Silage tank, construction:	Painted steel	Painted steel	Painted steel	Painted steel	Painted steel	Painted steel	Painted steel	Painted steel	N/A	N/A	Painted steel	***
Silage tank, capacity (m3):	32-60	32-60	32-60	2x25	2x25	23-40	20-30	2x8	N/A	N/A	50-100	Strongly recommended
Mill tank, capacity, construction:	Integrated in the hull or inserted in aft plattform	Integrated in the hull or inserted in aft plattform	Integrated in the hull or inserted in aft plattform	Integrated in the hull or inserted in aft plattform	Integrated in the hull or inserted in aft plattform	2 m³ stainless steel tank inserted in aft plattform	2 m³ stainless steel tank inserted in aft plattform	2 m³ stainless steel tank inserted in aft plattform			2 m³ stainless steel tank inserted in aft plattform	
Control room + pantry (m²):	53/33,5	53/33,5	73	53/33,5	28	23/13	23/13	23/13	14	8	7	
Living quarters, wardrobe, wc (m²):	45	45	12	45	22	23/8	23/8	23/8	4			
Workshop (m²):	24	24	67	24	18							
Technical room (m²):	36	36	47	36	21	28	28	18	8	4		
Machine room (m²):	36	36	58	36	39	46	30	24	20	16,5	17	
Metallized above water line:	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	
Certified according to:	NS 9415/NYTEK	NS 9415/NYTEK	NS 9415/NYTEK	NS 9415/NYTEK	NS 9415/NYTEK	NS 9415/NYTEK	NS 9415/NYTEK	NS 9415/NYTEK			NS 9415/NYTEK	
Designed according to:	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	DNV 1A1 Barge R3	
Optional equipment:	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	
Feeding system												
Possible number of feed lines:	4-16	2-12	2-8		2-6	2-6	2-6	2-4	2-4	2-3		
Standard location of selectors:	Side	Side	Side		Side	Bow	Bow	Bow	Bow	Bow		
Air cooling system:	U-profile	U-profile	110mm steel cooling pipes/ U-profile		U-profile	U-profile	U-profile	U-profile	Air-to-air cooler or U-profile	Air-to-air cooler or U-profile		AJ 130 and AJ 150 have also U-profile

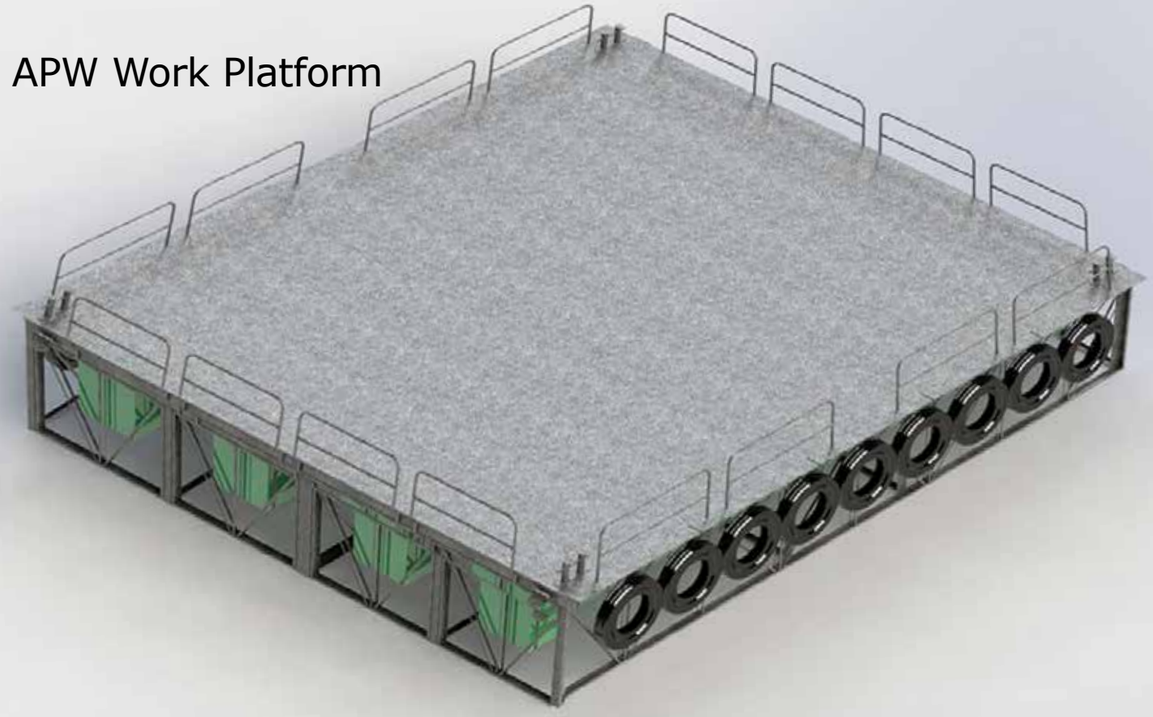
*Option to this can be; 2x11,5 silage tanks + 4x11,5 emergency silage tanks with out any facilities, ***Some variations may apply.

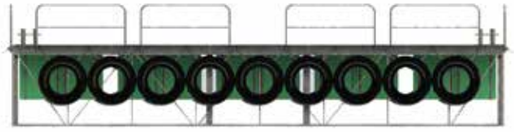
Certification guide, construction/anchoring:
The Wavemaster Feed Barges are designed in accordance with DNV 1A1 Barge R3 classification. Steel hull, superstructures and feed silos are manufactured using marine grade mild steel, type NVA or equivalent. All steel construction is performed in accordance with NS470, and all welding is tested by certified NDT (Non Destructive Testing) inspector. The silo modules are constructed with corrugated steel plates in order to get smooth internal surfaces and a high strength to weight ratio (not all models).

High quality on all windows, watertight doors and hatches. Extended bow and aft platforms is available as options. Well proven design and construction, combined with innovation makes Wavemaster Barges reliable, efficient and seaworthy barges. A wide range of models are available at a competitive price.

All barges are constructed according to NS9415:2009 Norwegian standard for floating fish farms. The barges are certified by Noomas.

APW Work Platform





Side view with floats and fendering.

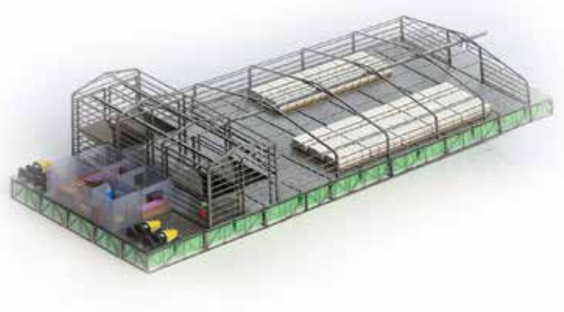
Side view with floats.

Wavemaster Work Platforms

- Load-capacity dimensions calculated according to customer needs.
- Structural strength calculated to withstand a significant wave height (Hs) of up to 2m.
- The modular construction/solution allows for easy containerisation and shipment anywhere in the world.

Float grid below the platform.

AP Platform Feed Barge



Transparent illustration showing silos and feed system. The house modules are flexible and can easily be tailor made for each location.

Wavemaster Platform Feed Barge

- Load-capacity dimensions calculated according to customer needs.
- Structural strength calculated to withstand a significant wave height (Hs) of up to 2m.
- The modular construction/solution allows for easy containerisation and shipment anywhere in the world.
- All Platform Barges include a control room for the feeding process using a CCS Feed System, sensors and cameras.
- Silos with 3 tons capacity are located in the bow.
- Equipped with a chain hoist trolley to lift up the feed to fill the silos. The number of silos per barge can be adjusted.

Local deck installation

The modules are transported to the locatation in parts and installed by experienced Wavemaster staff.

Flexible deck module sizes

The deck modules can be offered in five different sizes; 6x5m, 8x5m, 10x10m, 20x10m and 30x10m.

Withstands heavy loading

The modules are very stable and have a loading capacity from 6 tonns up to 40 tons on the largest deck model.

Tailor made platform barges

Tailor made solutions can be adapted for installation of any equipment that the customer need for the farm operation.

Hot dip galvanized construction

All structural steel components are hot dipped galvanized after manufacture. This has proven to be the most effective and durable coating for use on fish farming structures.

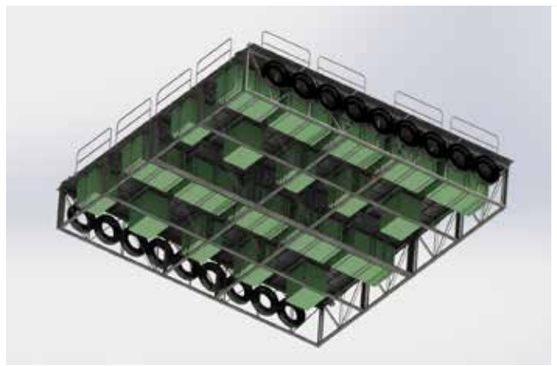
Designed for CCS Feeding System

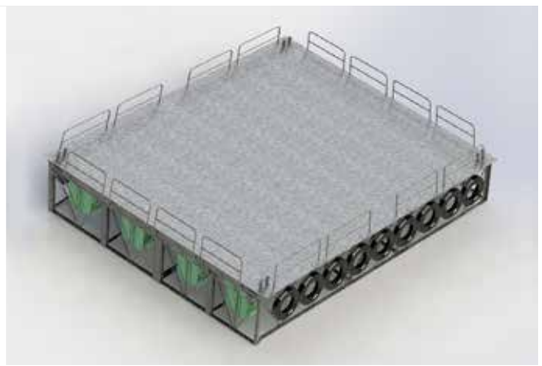
All modular platforms are designed for integration with the Akvasmart CCS Feed System, from Twin (2) to Hexa (6) parallel feed-line systems.

Wavemaster APW Work Platform - Specifications

Deck models:	APW 30	APW 40	APW 100	APW 200	APW 300	Comments
Length - Total (LOA) m:	6	8	10	20	30	
Beam - Total (BOA) m:	5	5	10	10	10	
Deck (m^2):	30	40	100	200	300	
Load capacity:	6 tons	9,7 tons	13 tons	27 tons	40 tons	
Depth to deck (mts):	1,5	1,5	1,5	1,5	1,5	
Freeboard full load, standard:	400mm	400mm	400mm	400mm	400mm	
Floats standard:	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Color on request (styrofoam filled)
Floats Increased Freeboard:	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Colour on request (styrofoam filled)
Handrails:	Optional	Optional	Optional	Optional	Optional	
Mooring points:	4	6	6	10	14	Mooring plate or pipes with flared bottom openings
Fendering:	Yes	Yes	Yes	Yes	Yes	Along sides on request
Deck:	2-3mm stamped plate, 32x5 grating, 4 mm checkered plate	2-3mm stamped plate, 32x5 grating, 4mm checkered plate	2-3mm stamped plate, 32x5 grating, 4mm checkered plate	2-3mm stamped plate, 32x5 grating, 4mm checkered plate	2-3mm stamped plate, 32x5 grating, 4mm checkered plate	
Hot Dipped Galvanizing:	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	
Duplex System (Galvanizing + Painting):	Available on request	Available on request	Available on request	Available on request	Available on request	
Cathodic protection:	Available on request	Available on request	Available on request	Available on request	Available on request	
Other equipment:	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	

Rugged and UV stabilized rotational moulded MDPE Floats, filled with expanded Polystyrene foam.





Safety details

All decks and platforms are supplied with all the safety gear required for the country of operation as a minimum. Typical standard / optional safety equipment may include: Safety handrails and non-skid surfaces, life rings with heaving line, boarding ladders, etc.

Design & Construction

All Wavemaster modular decks/platforms are designed/built supervised by professional naval/mechanical engineers. All welders are certified under AWS D1.1/D1.1M ed.2010

Wavemaster AP Platform Feed Barge

Platform models:	AP 50	AP 100	AP 150	AP 200	AP 300	AP 400	Comments
Feed capacity							
Loading capacity:	50 tons	100 tons	150 tons	200 tons	300 tons	400 tons	
Number of silos:	2-4	2-4	2-4	2-4	2-6	2-6	
Barge specifications							
Length - Total (LOA) m:	20	26	33	40	40	50	
Beam - Total (BOA) m:	12	12	12	12	17,5	17,5	
Depth to deck (mts):	1,5	1,5	1,5	1,5	1,5	1,5	
Freeboard full load (Standard Floats):	400mm	400mm	400mm	400mm	400mm	400mm	
Standard Floats:	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Colour on request
Floats increased freeboard:	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Rotational Moulded Polyethylene	Colour on request
Handrails	Optional	Optional	Optional	Optional	Optional	Optional	
Mooring points:	10	10	10	12	12	14	Mooring plate or pipes with flared bottom openings
Fendering:	Yes	Yes	Yes	Yes	Yes	Yes	Sides on request
Flooring:	4mm checkered plate	4mm checkered plate	4mm checkered plate	4mm checkered plate	4mm checkered plate	4mm checkered plate	Others on request
Discharge area (stern,m^2):	24	24	24	24	35	35	
Control Room (m^2)	14	14	14	14	14	14	
Room + Toilets (m^2):	14	14	14	14	14	14	Additional on request
Fuel Tank:	1000 to 4000 lts	1000 to 4000 lts	1000 to 4000 lts	1000 to 4000 lts	1000 to 4000 lts	1000 to 4000 lts	Optional
Hot dipped galvanizing:	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	Certified according to ASTM 123	
Duplex System (Galvanizing + Painting):	Available on request	Available on request	Available on request	Available on request	Available on request	Available on request	Extra protection for harsh enviromnments
Cathodic protection:	Available on request	Available on request	Available on request	Available on request	Available on request	Available on request	
Others Equipments:	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	Please inquire	
Feeding System							
Number of possible feedlines:	2-4	2-4	2-4	2-4	2-6	2-6	
Standard placement of selectors:	Bow	Bow	Bow	Bow	Bow	Bow	
Aircooling System:	Optional	Optional	Optional	Optional	Optional	Optional	

Certification and construction/anchoring:

Wavemaster Modular Decks and Platforms are designed and built supervised by professional naval and mechanical engineers to meet all required regulations. Steel hulls, superstructures and feed silos are manufacturing-certified steel.

All welders are certified under AWS D1.1/D1.1M, and all welding is tested by a certified NDT (Non Destructive Testing) inspector. As a standard all the deck/platform are hot dip galvanised in accordance with ASTM 123.

wavemaster™

Feed Systems

Matches fish appetite

The central feed system concept was invented by AKVA group in 1980 and Akvasmart CCS is today the most popular and reliable feed system world wide. The system is suitable for all species feeding on pellets. It is now also fully integrated with camera control, pellet- and environmental sensors, as well as Fishtalk production control software. All feeding and environmental data is stored in the Fishtalk database. This unique integration allows for full overview and control of all operational activities from farm site to top management level.

The Akvasmart CCS Feed System will feed the correct amount, at the optimal rate, on time and every time. This powerful system provides great opportunities to optimize the entire feeding process.

AKVAcontrol is the leading edge feed system software, now part of the Fishtalk software family. New functionality includes meal planner, group feeding and adaptive feeding. Combined with data from environmental sensors, this allows for efficient analysis and benchmarking between farm sites.

Akvasmart CCS Feed System

AKVAcontrol

AKVAconnect

Fishtalk Control

CCS Feeding Computer

Wireless Transmitter
with surface camera

The Akvasmart CCS Feed System is designed to handle more than 40 feed lines running in parallel and more than 1000 cage/tank units, centralized- or hopper feeders, all operated from one PC, iPad or smartphone.

Akvasmart CCS is the perfect choice for feeding fish, designed to fit the requirements from low capacity system such as CCS-32, up to high capacity systems such as CCS-110.

Feed Blower:
Generates transport air for the feed system.

Feed Silos:
Up to 8 silos can be connected in series for each feed line.

Cleaning Plug Injector:
The injector will blow the plugs one by one, cleaning the feed system using transport air.

Air Cooler:
Reduces the temperature of the transport air.

Air Control system:
Regulated air speed and keeping the pellet in the gentle feed handling area significantly reduce the risk of blockage and feed breakage.

Feed Dosers:
With capacities from 10g/sec up to 192kg/min. Up to 8 dosers can be connected in series for each feed line.

Preventing only 1% feed waste on a larger fish farm, can easily increase the bottom line by 50-100.000 US$.

Feed Selector Valve:
Distributes feed to the correct cage and ensures gentle feed handling. The Selector Valves can be offered with connections from 4 to 60 feeding pipes.

Integrated accessories:
A wide range of Akvasmart units such as sensors, cameras, and rotor spreaders can easily be integrated to the CCS Feed System.

Feed Pipes:
A wide range of high quality and durable Polarcirkel Feed Pipes are available in various dimensions and coil lengths up to 1000 metres.

Environmental Sensors

Camera Systems

Network Systems

Underwater Lights

Rotor Spreaders

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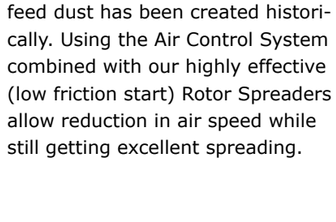
Feed accounts for 60-90% of the production cost in most fish farming around the world today. That makes every pellet count when it comes to financial results.

AKVA group Feed Care

Commercial Scale testing

AKVA group has developed a special feed durability test machine (Doris) that makes it possible for farmers and feed manufacturers to test and document the physical quality of different feed types. We work closely with expereinced feed suppliers to optimize feed handling.

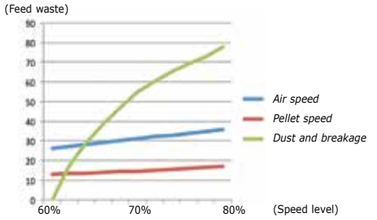


Our patented feed test unit "Doris", is also used by leading fish feed manufacturers and other aquaculture companies.

Video control of the pipes.

Monitoring and regulating the transport air speed is one of the most important factors. "Speed kills" also when it comes to feed systems, and only a 10-20% reduction of transport air speed make a significant reduction in feed dust and pellet breakage. This is where most of the feed dust has been created historically. Using the Air Control System combined with our highly effective (low friction start) Rotor Spreaders allow reduction in air speed while still getting excellent spreading.

Centre of Aquaculture Competence, CAC. The world´s largest full scale test site for salmonidae is owned by Marine Harvest, Skretting and AKVA group.



Graph showing how pellet speed influences dust and breakage.

Preventing up to 3% feed waste

It is quite common for large scale fish farms today to spend 10-20.000 US$ average per day in fish feed. Preventing only 1% feed waste (dust and breakage) can add a total of 50 - 100.000 US$ to the bottom line each year! Consequently, it is critical that your feed system reliably deliver the feed to the fish 100% intact, at the correct rate, exactly the amount the fish wants to eat and with optimal spread.

All feed system equipment is tested by experienced AKVA group technicians to make sure all equipment meet our high standard.

Important elements in the feeding process

- **Feed storage, how to:**
  Fill silo
  Store feed
  Take feed out of silo
- **Pellet transport**
  Pipe work
  Connections
  Adjustment
  Cleaning
- **Air transport**
  Air temperature
  Cooling
  Air speed
  Back pressure
- **Adjustment in control system**
  Feeding speed
  Air speed
- **Feed spreading**
  Type of spreader
  Spreading area
- **General maintenance**
  All equipment

All issues above are down to how to transport the pellet undamaged to the fish!

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Cooled and controlled air flow

Air Blower, Air Cooler and Air Control

Feed Blowers

The blower generates the air pressure to transport the feed to each tank/cage. The combination of air control system and frequency regulated blowers makes it possible to optimize the pellet transportation. The air speed can be adjusted to optimize both feed spread and gentle feed handling. The blowers are delivered in high quality silencer cabinets which ensures a comfortable work environment.

AKVAconnect provides detailed feeding data from the silos to the cages/tanks.

The feed enters the air flow through the Doser Valves and is then blown through seamless stainless pipes and up to the Selector Valves.

Sound protected machine room with Feed Blowers and generators.

Inspection of a Feed Blower installation, noice cabinets with easy access.

Air Coolers

Depending on the transport distance and ambient temperature, many feed types and feed systems will benefit from installing air cooling systems.

Too high temperature may cause lipids to be released from the pellets and even proteins to be denaturated. This will lower the nutritional value of the feed.

If the lipids are released from the feed during transportation this will increase the risk of pipes being blocked hence increasing the need for pipe cleaning.

Feed blowers and air coolers come in a variety of models.

The cooling pipes are integrated in the hull construction on most of our Feed Barges.

AKVAconnect process control offers special alarm functions for air control (speed, temperature and back-pressure).

Air Control System

Akvasmart Air Control System with regulated air speed ensures optimal pellet flow, significantly reducing the risk of blockage and breakage. If the pellet/air speed is too low, the risk for pellet blockage is increased. If the pellet/air speed is too high, dust and breakage is increased. The system also monitors and logs air speed, back-pressure and temperature.

The Air Control unit is installed between the Air Cooler and Feed Doser Valve.

The Air Control system is visualized in AKVAconnect through a simple graph per feeding line. The graph displays real-time data for each unit being fed.

Too low pellet speed.

Optimal pellet speed.

Too high pellet speed.

From silo to fish - A critical part of the feed transport

Feed silos and Feed Doser Valves

Feed Doser Valves

A custom Feed Doser Valve is used to transfer the feed into the air flow. As this is a critical part of any feed system, it is important that only FEED CARE OPTIMIZED equipment is used. In order to meet all our customer's needs, we can offer both Feed Doser Valves and Feed Augers with Sluice Valves for this purpose. The CCS Feed Doser Valves are designed in two main models. Vari Doser 1500" and Feed Doser 4000".

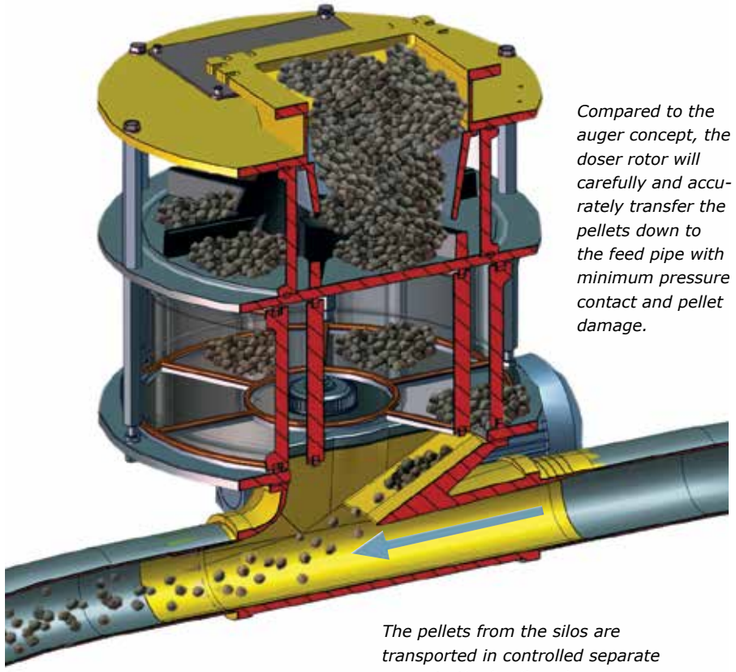
The Akvasmart Feed Doser Valves have capacities from 10g/sec. up to 192kg/min.

Silo Systems

A wide range of different feed tank solutions and sizes can be delivered to suit any requirements. We can deliver square or round silos in both aluminum and steel. Contact our sales department for more details and specifications.

Feed silos can be delivered in wide range of types, shapes and sizes.

A smart silo outlet gate, made from galvanized steel, can easily be installed at the doser top in between the silo flange and feed doser valve.



Compared to the auger concept, the doser rotor will carefully and accurately transfer the pellets down to the feed pipe with minimum pressure contact and pellet damage.

The pellets from the silos are transported in controlled separate doses to the feeding pipe below and then blown to each cage.

Service and cleaning of the feed doser can easily be done in 30 minutes. See more details in our CCS user manual.

Feed Doser:	VariDoser Start	VariDoser	Doser 4000
Min. feed rate (g/sec):	30	100	200
Min. feed rate (g/sec) - pulse:	15	75	150
Max feed rate (g/sec):	400	1250	2500
Material:	Polyethylene (PE) / Cast iron/ Stainless steel		
Weight:	75kgs	75kgs	95kgs

The leading feed concept since 1980

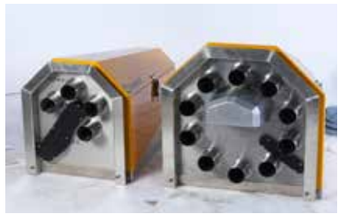
Feed Selectors

Feed Selector Valve

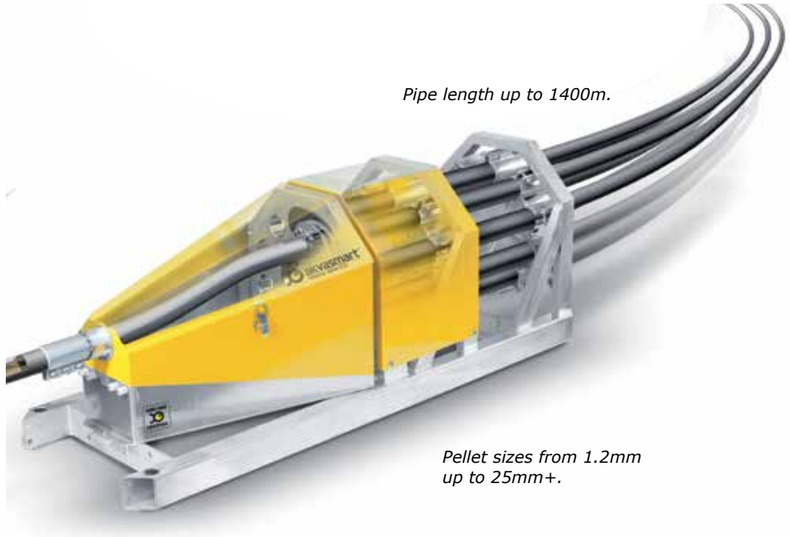
The Feed Selector Valves disttributes the feed to the correct cage and is the connection point for the PE feeding pipes. The pipes are exposed to the full forces of the ocean, and consequently we have designed a very rugged strain relief bracket that can handle the expected loads. Our product line includes a wide variety of Selector Valve models with connections from 4 to 60 feeding pipes (depending on model).

The CCS system is designed to withstand the extreme forces of weather and salt corrosion.

Feed Selectors can easily be installed at the front or the side of the barge.



A new improved construction makes the Feed Selectors easier to open, clean and maintain.



Pipe length up to 1400m.

Pellet sizes from 1.2mm up to 25mm+.

Materials; aluminium, galvanized and stainless steel.

The new Wavemaster AC650 Feed Barge has 12 silos and 6 Feed Selector Valves.

Feed Selector	CCS32	CCS63	CCS90	CCS110
PE pipe dimension:	32mm (1”)	63mm (2”)	90mm (3”)	110mm (4”)
Max pellet size:	5-7mm	9-12mm	25mm (1”)*	25mm+ (1”)*
Outlets:	32-60	24-32	4, 10 or 24	4 or 8
Materials:	Stainless Steel/ Aluminum	Stainless Steel/ Aluminum	Stainless Steel/ Aluminum	Stainless Steel/ Aluminum
Weight:	45-55kg*	45-55kg*	50-65kg*	50-65kg*

* Depending on model/ex. pipe restrainer

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AKVA basic Feeding System

A complete, portable feed system in one small compact unit, provides better feed control and growth

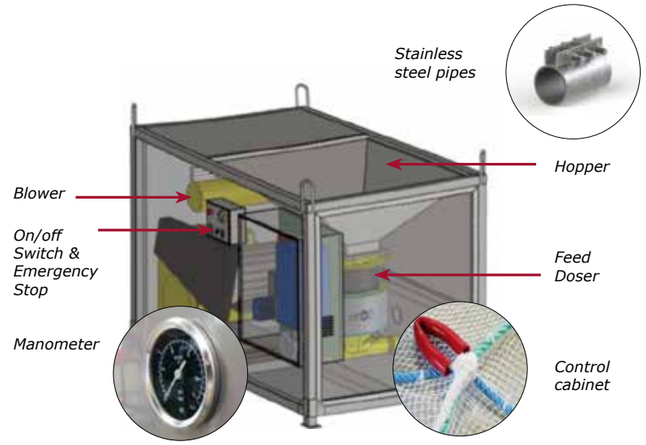
A compact solution for smaller locations

A user friendly and affordable feed system

Semi-automatic feeding system for fish farming. The centralized Feeding system AKVA basic has been specially designed for use in all types of farms due to its versatility in installation, easy operation and maintenance. During feeding, the feed pipe is manually operated by a single person, in communication with a AKVA basic operator in order to coordinate on and off times.

By opening/closing several guillotines strategically located on the system we are able to select the cage to be fed.

The AKVA basic is loaded manually with 20-25 kg feed bags, has a standard capacity of 125 kilos. Silos with extended capacity are available upon request.



The new feeding unit is made of a stainless steel case containing an Akvasmart blower, doser and control cabinet, which makes the AKVA basic a durable and reliable equipment.

Easy installation, operation and low maintenance makes AKVA basic an ideal and reliable equipment on smaller locations or isolated farms.

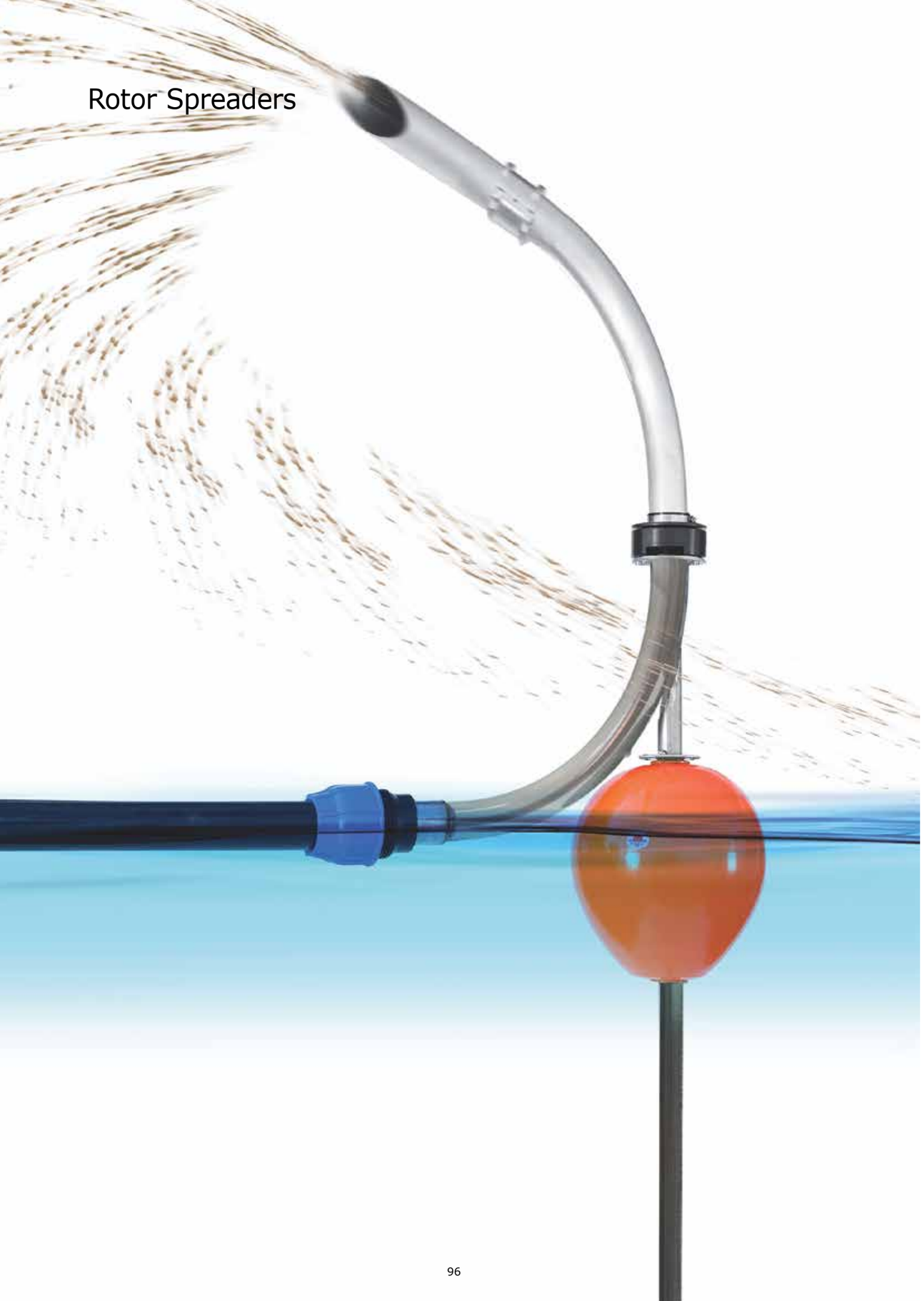
AKVA basic feed system							Comments
Equipment:	Silo capacity	Feeding pipe	Frequency inverter	Air Cooler	Selector Valve	CCS Control	
Standard *	125kg	90mm	-	-	-	-	Engine and Blower always works at 100% of capacity.
Upgrade 1	300kg	90mm	-	-	-	-	Increase silos feed capacities.
Upgrade 2	125kg	63-110mm	-	-	-	-	Based on client needs.
Upgrade 3	125kg	90mm	yes	-	-	-	Accurate control of air lines speed and feed calibration.
Upgrade 4	125kg	90mm	-	yes	--	--	Reduces temperature in the air line.
Upgrade 5	125kg	90mm	-	-	yes	-	Equiped with manual control for the Selector Valve. Rotor Spreader can be install in each cage.
Upgrade 6	125kg	90mm	yes	-	yes	yes	Centralizes all parts of the system in one computer.

** The **AKVA basic** standard model´s size is 2x1x1m, manual operation and is equippet with; 22kW Blower, 4000 Doser, On/off Switch, Timer, Manometer and Emergency Stop.*

***AKVA compact** system is larger with 20´- 40´containers, CCS Control and automatic operation.*

akvasmart™

Rotor Spreaders



Faster and even growth from excellent feed spread

Rugged and userfriendly

The unique Rotor Spreader is designed to provide excellent feed spread in cages. All our models have adjustable light weight aluminium rotor pipes that allow for lower air speed for start-up and rotation. This means less dust and breakage, power consumption, back pressure, air temperature, noise and wear and tear on the feed pipes.

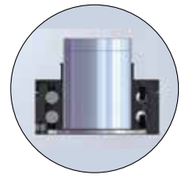
The Rotor Spreaders are designed for all types of cages. More than 7500 units are delivered world wide.

Our unique ventilated Zenon bearing requires no regular cleaning and does not corrode. Due to its light displacement and low point of gravity vs. centre of buoyancy, the Rotor Spreader is very stable in rough seas.

Strong feed pipe connection floating on the surface minimizes mechanical loads compared to submerged connectors.

The Rotor Spreaders are easy to install and simple to maintain.

The new twistable rotor tips are less curved and ensures more gentle feed care.



The new ventilated bearing has extra low friction and requires no regular cleaning and does not corrode!

Rotor Spreader designed for tanks, with 32mm or 63mm feed pipe.

A light weight but strong construction ensures reliable performance in rough water.

A heavy keel weight in galvanized steel is keeping the Rotor Spreader stable in rough seas.

Rotor Spreader	RS-63C	RS-90C	RS-110C
PE pipe dimension:	63mm (2”)	90mm (3”)	110mm (4”)
Max pellet size:	12mm (1/2”) *	25mm (1”) *	25mm+ (1”) *
Recommended RPM:	50-100 *	50-100*	50-100 *
Spread diameter (adjustable):	Approx. 4-12m Ø * Approx. 12-40’ Ø *	Approx. 5-18m Ø * Approx. 16-60’ *	Approx. 5-18m Ø * Approx. 16-60’ *
Materials:	Stainless Steel/Alum. Rotor/POM (Delrin) Polyform buoy	Stainless Steel/Alum. Rotor/POM (Delrin) Polyform buoy	Stainless Steel/Alum. Rotor/POM (Delrin) Polyform buoy
Height above water:	1,2m (4’)	1,2m (4’)	1,4m (4’6”)
Draft:	1,8m (6’)	1,8m (6’)	1,8m (6’)
Total weight:	Approx. 30kg (66 lbs.)	33kg (73 lbs.)	38kg (84 lbs.)

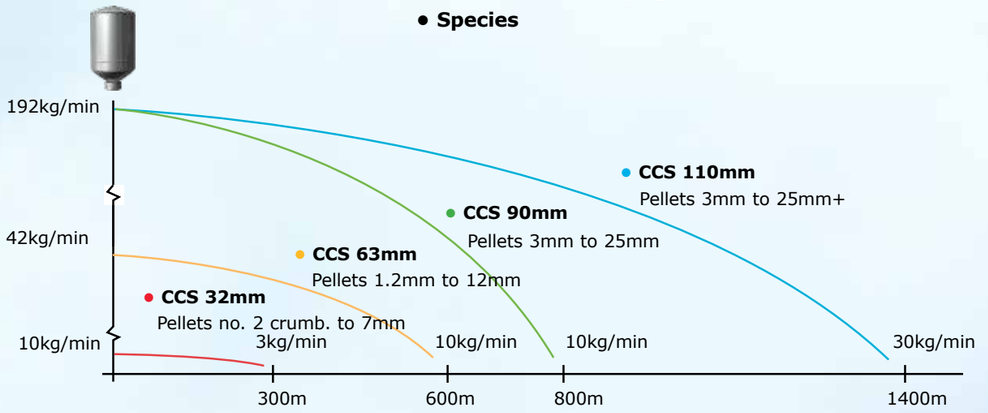
* Depending on feed system and feed type

Feed System capacities and transport lengths

The Akvasmart CCS Feed System is designed to fulfill all feeding requirements, regardless of species or how you want to feed your fish.

The configuration of the system is based on the following factors:

- **Transport lengths**
- **Biomass (feed amount)**
- **Number of units (cages)**
- **Species**



* The capacity of the feed system depends on the technical quality of the pellet, the feeding regime as well as the length of the feed pipe.

Feed System Specifications

System		CCS-32	CCS-63	CCS-90	CCS-110	Comments
Feeding pipe size:	OD (mm)	32 (1”)	63 (2”)	90 (3”)	110 (4”)	Imperial (North America)
Wall thickness:	(mm)	2,9 (0,11”)	4 (0,16”)	7 (0,28”)	6,3 (0,25”)	
Feeding data (for each feed line):						
Pellet sizes: */**	Max.(mm)	5 - 7	9 - 12	17 - 25	25+	
	Min.(mm)	No.2 crumb.	1,2	3	3	This must be evaluated in each specific case.
Max. feeding capacity: */**/***	kg/hour	648	2 520	5 220	5 220	with "VariDoser 1500"
		–	–	11 520	11 520	with ”FeedDoser 4000”
Max. feeding rate: */**/***	kg/min.	10,8	42,0	87,0	87,0	with "VariDoser 1500"
		–	–	192	192	with ”FeedDoser 4000”
Min. feeding rate: */**/***	kg/min.	1,2	2,4	3,0	3,0	
Min. feed dose (single dose) */**	grams	10	20	40	50	with "VariDoser 1500"
		–	–	200	200	with ”FeedDoser 4000”
Transport lengths:						
Max. feed pipe length:	m	300	600	800	1400	*/**
Max. feeding rate at max. feeding pipe length:	kg/min.	3,6	12	36	30	***
Max. feeding rate at half of max. feeding pipe length:	kg/min.	5,4	21	108	150	***
Max. feeding rate at short feeding pipe length */**	kg/min.	10,8	42,0	87,0	87,0	with "VariDoser 1500"
		–	–	192	192	with ”FeedDoser 4000”
Power consumption (max):						
Feed Blower:	kW	7,5	15 - 18,5	22 - 30	45	
FeedSelector Valve:	kW	0,18	0,18	0,18	0,18	
Feeder: FeedDoser/ VariDoser:	kW	0,37	0,75			Max. load/unit
Feeder: Auger & Sluice Valve:	kW	0,37 1,5	0,75 1,5	1,5	1,5	

* Depending on actual transport distance ** Depending on type of feed, technical feed quality, pellet size, feed rates and system settings
*** At continuous feeding **** Depending on actual feeding pipe length

Control Cabinet	Standard 400VAC 50Hz	Comments
Power consumption:	From 8kW to 185kW	Single CCS 32 to Quatro CCS 110
Size:	2100mm x 1200mm x 500mm	HxWxD - in mm
Weight:	From 120kg to 400kg	Single CCS 32 to Quatro CCS 110

PE Feeding pipes	Dimensions				
	OD	ID	Wall thickness	SDR**	Weight/m
32mm	32mm	26,2mm	2,9mm	11	280g/m
63mm	63mm	55mm	4mm	15,75	750g/m
*75mm**	*75mm*	*66,4mm*	*4,3mm*	*17,6*	*980g/m*
*90mm**	*90mm*	*79,8mm*	*5,1mm*	*17,6*	*1390g/m*
90mm	90mm	76mm	7mm	12,8	1900g/m
110mm	110mm	97,4mm	6,3mm	17,6	2090g/m

** Not standard dimensions for Akvasmart CCS Feed System. ** SDR = Outer diameter (OD) / Wall thickness.*

CCS Feedsystem Software

Correct amount of feed, always served on time

AKVAcontrol is a powerful and advanced software for daily control of all your feeding processes. Combined with Akvasmart CCS Feed System, it is the most adaptable and user friendly system on the market. AKVAcontrol is developed over the last 30 years in close cooperation with fish farmers all over the world. This has resulted in full integration with camera systems, pellet- and environmental sensors.

AKVAcontrol software combined with the new AKVAconnect process platform provides full overview and control.

Biological approach

The only feed system software with biomass regulated feeding regimes based on accurate monitoring of fish appetite and environmental data.

Environmental sensor data

Oxygen-, temperature- and current sensors are fully integrated in AKVAcontrol. All sensor data are displayed in real time and logged for further analysis. This allows for optimal feeding at all times.

Fishtalk software integration

All data generated in AKVAcontrol is accessible in Fishtalk Control, providing end-to-end production overview, control, analysis, benchmarking and reporting.

The most adaptable and user friendly feeding system on the market.

All feeding data is easily accessible in Fishtalk Control.

Alarm output to site alarm.

The feeding can be remote controlled from an iPad or smartphone.

Accurate monitoring of fish appetite.

Environmental data displayed in real time and logged.

Automatic or manual camera selection.

Feeding according to received data.

Key functionality:

- Full farm overview at a glance
- System capacity planning
- Advanced meal planning
- Multiple group feeding regimes
- Hopper control
- Integrated feeding camera control
- Accurate Air Control System
- Wizards
- Powerful reporting and analysis tools.

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Camera and Sensor Systems

Full overview, complete control

Akvasmart's advanced video camera and sensor systems monitor both the fish and the feeding process. This ensures optimum operations and a healthy environment for the fish.

Flexible camera solutions, like monochrome feeding cameras or winch controlled pan & tilt 360° Twin colour cameras, provides crystal clear pictures. Wireless transmission of surface and underwater video images, feeding- and environmental data to the farm base.

Dedicated camera and sensor solutions

SmartEye Surveillance Camera
Detects unwanted visitors, predators or feed spread. Powerful optical zoom provides close-up details from over 1000m away.

HR Cameras
These monochrome underwater video cameras are the world´s most popular feeding cameras.

SmartEye Cameras
The SmartEye Camera System is a class above and the most advanced system on the market. SmartEye 360 Twin can pan and tilt 360°!

Multi Sensor
New environmental sensor houses six smart water quality sensors and measures parameters as: Dissolved oxygen, salinity, pH, temperature and conductivity.

Oxygen Sensor
Environmental sensor for measuring oxygen and temperature, (only in AKVAconnect).

Current Sensor
The current sensor will prevent feed waste caused by tidal current that is pushing pellets out of the cage.

Temperature Sensor
Environmental sensor for measuring temperature, (only available in the AkvaControl/CCS system).

Underwater- and surface cameras

Akvasmart cameras have been produced for more than 20 years. Based on this experience AKVA group has a wide product range of cameras from basic fixed monochrome and dual pan/tilt colours to surveillance cameras tailored for aquaculture.

Akvasmart Cameras can be used to monitor:

- **Underwater feeding activity**
- **Surface feeding activity**
- **Fish maturation**
- **Fish behaviour**
- **Morts at the cage bottom**
- **Fish parasites (i.e. sea lice)**
- **General surveillance**

Akvasmart cameras provides perfect overview and ensures fast and accurate camera control.

The video camera looks straight up towards the surface during the feeding in order to see uneaten pellets.

An important part of the sensor and cameras is the infrastructure that transmits the signals/video from cage to office. In the Akvasmart system there are several possibilities either wireless or with cable.

Akvasmart cameras can monitor fish surface activity and feed spread, even in poor light conditions.

Environmental Sensors

Environmental sensor data is becoming an important factor in fish farming, to know the environment will always improve your production.

Every pellet counts

Feed accounts for 60-90% of the production cost in most fish farming today. That makes every pellet count when it comes to financial results.

The first parameter measured is temperature - to know the water temperature help to feed the fish correctly. The second parameter is oxygen, an important parameter helping to decide when to feed. The system will stop the feeding at low oxygen levels in the water. The third parameter is current. When the current speed exceeds the limit, the feeding temporarily stops in the cages and resumes at slack current later. All other cages will be fed as scheduled.

Using environmental sensors combined with AKVAconnect will monitor and control secure the stability in your system.

Full control of the environmental data will ensure correct farming decisions.

There are increasing numbers of parameters that help the fish farmer to understand the environmental conditions in the cage and how it effects the biomass. This knowledge is highly important in industrial fish farming.

The current sensor system will prevent feed waste caused by tidal current pushing pellets out of the cage.

Full overview ensures safer environment

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SmartEye Twin 360 Camera System

SmartEye 360 Twin with 2 cameras

SmartEye 360 Twin

Top of the line - feeding and inspection cameras

The SmartEye Twin 360 Camera System is a class above and without doubt the best system of it´s kind on the market. It is an advanced feeding and inspection colour camera with unique features that can be operated from the cage, a work boat, the feeding control room and via the internet. It provides sharp, colour and/or monochrome video underwater images.

Exceptionally sharp and clear video images in full colour provides useful information about your fish.

Standard configuration includes upper camera and lower camera in high resolution colour, but monochrome is used to get very high light sensitivity for looking down into deep and dark cages. Both cameras are syncronized for full 360° vertical movement using one joystick. No external moving parts will reduce the risk of leaks.

Combined with the dual Smart-Winch system, SmartEye 360 Twin provides a great insight into the feeding response and condition of your fish. It is a highly reliable camera that is connected to the base via our new CAP wireless video transmitter. SmartEye 360 Twin is also available with built-in depth- and temperature sensor.

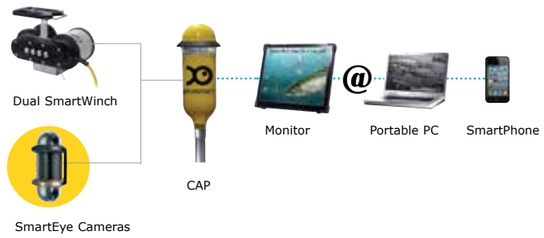
Unique camera features - a class above!

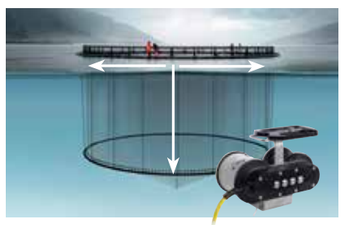
Robust and waterproof connection cable.

Advanced upper colour video camera and a high light sensitive monochrome underwater camera.

Synchronized endless 360° pan and tilt.

Fast and accurate camera and winch control using a PC, iPad or smartphone.





A flexible dual SmartWinch allows easy and accurate vertical and horizontal positioning inside the cages.

Cameras, cables and connection plugs are pressure tested down to 40m to ensure that the equipment is 100% pressure proof.

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Crystal clear first choice feeding cameras

Basic HR Feeding Camera

Super HR Feeding Camera

HR Feeding Cameras

The Akvasmart HR cameras are the world's most popular feeding camera series. These are stationary cameras hanging below the fish' eating area (typically 5-8m) aiming straight up to detect uneaten pellets sinking towards the camera.

All of our cameras can be used with Akvasmart hardwired or wire-less camera systems and can be operated from the cage, a work-boat, feeding control room or via the Internet. One camera is usually permanently installed in each cage.

Basic HR Camera

The Basic HR Feeding Camera is a simple, reliable and affordable monochrome camera and a smart choice if you need effective feeding control in cage.

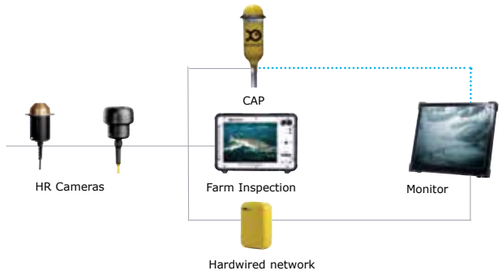
Super HR provides exceptionally sharp and crystal clear video images, even during poor light and visibility conditions.

Super HR Camera

The Super HR Feeding Camera is a rugged and reliable high-resolution monochrome camera designed for use under all conditions.

A flexible, popular and affordable camera solution!

Robust and reliable suspension bridle.
The camera is built into the non-fouling bronze top of the Super HR housing.
Robust urethane underwater cable includes a waterproof connection plug.



Looking straight up towards the bright surface makes it easy to spot uneaten pellets.

Up to three HR cameras works with the advanced wireless CAP transmitters. These also include built-in surface cameras.

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SmartEye Surveillance Cameras

Complete overview of your barge and sites

A range of SmartEye Surveillance cameras provide better control over unwanted visitors, predators, feed spread or simply added safety when working alone at the farm.

These are advanced IP cameras with powerful 24x optical zoom, clear pictures and smart function-ality, which can easily be operated from the cage, workboat, control room or via Internet.

Smarteye Surveillance cameras have full color but they will switch to mono-chrome under low light conditions.

Surveillance cameras provides added safety when working alone on the feed barge.

Surveillance cameras can monitor the deck, machine room, feeding system or other vital areas on the barge.

The camera can pan 360°, and tilt 90°.

Surveillance camera with 90° to 10° zoom (24x optical).

Detects predators and un-wanted visitors and increase safety when working alone on site.

Camera Specifications

Cameras	SmartEye 360 Twin		360 Twin with 2 cameras	Super HR	Basic HR	Surveillance		
Colour:	Upper: Colour	Lower: Mono.	Upper/Lower: Colour	Monochrome	Monochrome	Colour	Colour	Colour
Type:	Analog	Analog	Analog	Analog	Analog	IP	IP	IP
Resolution:	480 TVL	570 TVL	650 TVL	600 TVL	600 TVL	HD 720p	HD 720p	HD 720p
Angle of view:	Fix: 60	Fix: 70	Fix: 72	Fix: 72	Fix: 72	52°-4,4° optical	Fix: 84° dig. zoom	Fix: 84° dig. zoom
Cable:	75m (246')* PUR	75m (246')* PUR	30, 50, 75m (99, 165, 246') PUR	30m to 100m (99-328') PUR	30 to 100m (99-328') PUR	> 100m (>328')	> 100m (>328')	> 100m (>328')
Depth rating:	75m (246')*	75m (246')*	75m (246')*	100m (323')*	100m (323')*	Outdoor IP 54	Outdoor IP 54	Outdoor IP 52
Power:	12V DC	12V DC	12V DC	12V DC	12V DC	PoE	PoE	PoE

* Limited by cable

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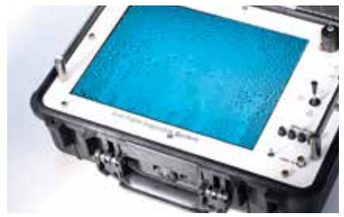
Fish Farm Inspection System

- rugged, portable feeding control

The Fish Farm Inspection System gives crystal clear video images from the submerged camera during feeding, and therefore provides a unique possibility to feed according to the fish appetite. The built-in battery gives the flexibility to use the system without any other infrastructure and the ruggedized system is built into a PELI-case.

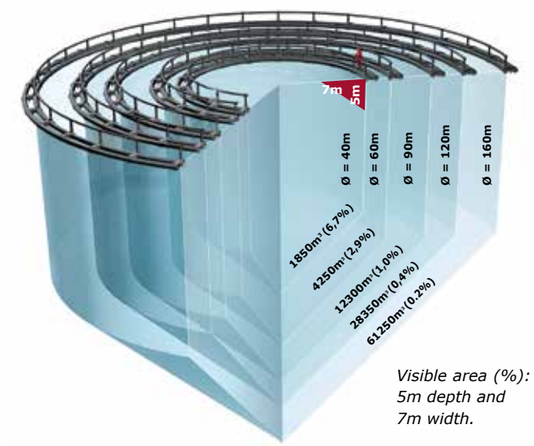
Accurate fingertip control provides full overview of the cage in a few seconds, a smart and userfriendly solution.

The new inspection system can easily be connected to Akvasmart cameras such as; SmartEye 360 Twin, Basic- HR and SuperHR. There is also an integrated Pan/ Tilt controller for the SmartEye 360 Twin Camera.



LCD screen made for rough, daily use and provides excellent readability in all light conditions.

A rugged, portable unit with internal battery and waterproof connection plugs.



Visible area (%): 5m depth and 7m width.

Why use a camera to monitor feeding?

Cage sizes have rapidly increased over the last 20 years, and as a result, the visible area has decreased accordingly. In a cage of 160m circumference, only 0,2% is visible from the surface. Therefore a submersible camera is a requirement for monitoring and controlling feeding.

The Inspection System is tailor made for control of feeding and fish behavior, and can easily be connected to Akvasmart cameras like SmartEye, Super HR and Basic HR.

Fish Farm Inspection System	
Power supply:	230v AC
Power supply: (optional external battery)	12V DC
Power consumption:	30W * 230v AC - 400mA 12v DC - 2,75A
Internal battery capacity:	13Ah/12v DC 3 - 6 hours *
Sizes: (length/width/height - weight)	470mm x 350mm x 180mm - 10kg (18,3” x 14,3” x 7” - 22 lbs)
Ingress Protection. Lid closed:	IP68
Lid open:	IP65

* Depending on connected equipment

Environmental Sensors

Environmental data - a critical feeding parameter

To know the environmental data such as temperature, oxygen, salinity, pH and current speed and direction is important when feeding fish. Akvasmart Feeding Software allows full control of the environmental status on the site, at all times. The data can be viewed real-time or logged for later analysis. The Akvasmart software can also be set to automatically control the feeding based on these parameters.

Temperature – the foundation for all feeding regimes and growth models.

There can be high temperature differences in different water layers. It is therefore important to know the exact temperature in the depth where the fish are eating.

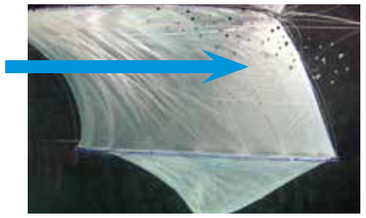
Temperature measurements are done in our oxygen and multi-parameter sensors and in the Akvasmart Temperature Sensor. These sensors are reliable and robust and can be submerged at the desired depth.

The new compact Multi Sensor has 6 different functions and 12 parameters including temperature and oxygen control.

Accurate real time readings are displayed and logged in the control software and AkvaControl will calculate the expected daily feed amount based on feed tables with these temperature data.

Oxygen data – an important factor for growth and fish welfare.

Oxygen measurements are done with our different oxygen and multi parameter sensors and will also be logged and displayed in the control system.



Environmental current knowledge will help you to prevent feed waste.

Water flow or current is an important parameter when it comes to feed waste. To feed when it´s to high a current will lead to feed waste and uneaten pellets.

AKVA group offer two types of current sensors. The Tilt sensor measures only one current value while the Doppler measures current speed and direction at three different depths.

Environmental sensors are a smart investment that will ensure efficient feeding.

AOS OxyBox – stand alone system for oxygen and current measurements

It´s a flexible system that's self powered from battery and communicate via Internet. Communication is standard via Iridium (satellite). All information from the AOS Oxy Box are presented on a WEB page that makes it easy to access and evaluate.

AOS OxyBox - a complete stand alone system for measuring oxygen and current.

AOS oxygen data outside (blue) and inside (red) the cage. (mg/l)

AOS Sensor Buoy Current is a virtually maintenance free satellite based system for measuring real time current from 3 depths.

Correct feeding is always the key to achieving good farming results. The Doppler Pellet Sensor allows the fish to be fed to satiation automatically.

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AOS Sensors - online sensor data worldwide

AOS Sensor Buoy Current

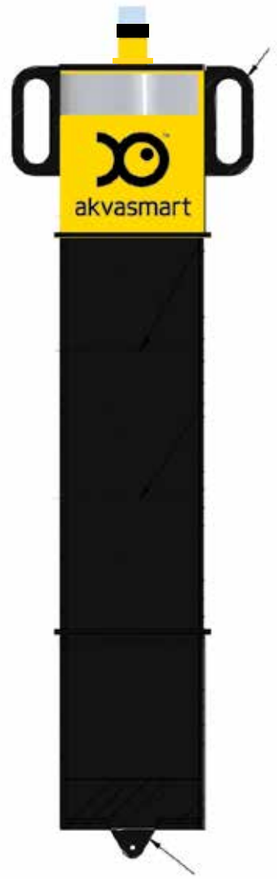
You can simply receive oxygen-current,- temperature-, and salinity data from all your farms and locations from a WEB-site, using an AOS online system with internet connection. The main part of AOS is a receiver of sensor data that transmit the data further to a sentral server, using an international satellite network called Iridium. The network is available almost in every corner of the world without using any local network suppliers. You will get access to the server with your own username and password and can enter and check your status whenever and wherever you want.

AOS is logging and saving data for export to Excel and eventually local saving and later analyzis.

AOS Sensor Buoy Current are equipped with a yellow coloured top, a warning light and a reflex tape to ensure better visibility.

Current data is a very important factor for correct feeding and various operations like debugging, sorting, retrieval and delivering of fish etc.

The blue line is showing current speed (m/sec) and the red dots are showing current direction on a selected depth the last 5 days.



The system is driven by a built-in battery with approx. 3 - 4 months duration.

The AOS buoy is made of Polyehylene (PE), has no moveable parts and is therefore virtually maintenance free.

The Sensor Buoy messure current speed and current direction from three different depths, (5, 10 og 15 meters) below the buoy. We are usings the most avanced doppler technology to ensure accurate data supply.

AOS Doppler Current Sensor unit

The AOS Sensor Buoy Current is moored two diameter lenghts away from the location to avoid impact from the cages.

The AOS OxyBox can messure oxygen and temperature from up to 3 sensors. See more data on next page.

AOS Sensor Buoy Current	
Dimensions	
Height:	250cm
Diameter buoy:	36cm
Width incl. handles:	60cm
Above sea level:	approx. 100cm
Weight:	45kgs
Material, buoy:	Polythylene (PE)

Environmental Sensor Specifications

Temperature - the foundation for all feeding regimes and growth models

There are two different temperature sensors: a separate sensor/ stand-alone sensor for connecting to AKVAcontrol or integrated in the optical oxygen sensor for using in AKVAconnect and OxyBox.

Oxygen – an important factor for growth and fish welfare

The oxygen sensors are with optical reading which reduces the need of calibration and maintains high accuracy and operates with no drift over long-term deployments. On the Oxygen RDO all this information is stored in the replaceable CAP tip. The optical sensors have a fast respons and maintains stability, even in dynamically changing conditions.

Environmental current knowledge prevent feed waste

An important parameter is the current or water flow when you feed but also to know your site. We can offer two types of current sensors, the Tilt sensor that gives current speed in one layer and the Doppler current profiler that gives you speed and direction at three different levels in the water column.

Full environmental overview - know your site

The new Multi Sensor is a compact instrument that houses six water quality sensors and measures 12 parameters: • Actual and specific conductivity, salinity, total dissolved solids, resistivity, and density • Dissolved oxygen • ORP • pH • Temperature • Water level and water pressure (absolute)

Intelligent Pellet Sensor with built-in camera

The Doppler Pellet Sensor will regulate the feeding based on the amount of pellets passing the Doppler´s sensing area.

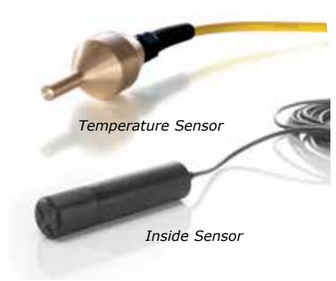
Temperature Sensors	Separate	Inside
Resolution:	+/- 0.1° C	+/- 0.1° C
Accuracy:	+/- 0.5° C typical	+/- 0.1° C typical
Operating temp.:	0-50° C / 32-122°F	0-50° C / 32-122°F
Depth rating:	30m ltd. by cable	210m ltd. by cable
Housing:	Bronze	Polyethylene
Cable:	30m urethane	30m urethane

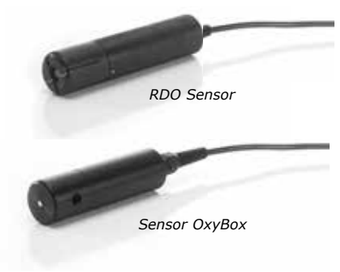
Oxygen Sensors	RDO sensor	Sensor OxyBox
Accuracy:	+/- 0.1mg/L 0-8mg/L +/- 0.2mg/L 8-20mg/L +/- 0.10% 20-50mg/L	+/- 0.1° C typical
Operating temp.:	0-50° C / 32-122°F	0-50° C / 32-122°F
Depth rating:	210m ltd. by cable	300m ltd. by cable
Housing:	Polyethylene	Polyethylene
Cable:	10 or 50m	10 or 50m

Current Sensors	0-50cm/sec	0-100cm/sec
Accuracy:	+/- 0.1cm/sec	+/- 0.2cm/sec
Measurement range:	0-50° C / 32-122°F	0-50° C / 32-122°F
Measuring principle:	Electronic tilt sensor	Electronic tilt sensor
Power consumption:	75mA	75mA
Depth rating:	Polyethylene	PE/alu. or SS wings
Housing:	Acrylic/Pom/Alu.	Acrylic/Pom/Alu.
Cable:	30m Polyethylene	30m Polyethylene

Multi Sensor	
Supported parameter:	Actual conductivity, specific conductivity, dissolved oxygen, pH, OPR, temperature, water level/depth/pressure (absolute)
Oxygen:	+/- 0.1mg/L 0-8mg/L +/- 0.2mg/L 8-20mg/L +/- 0.10% 20-50mg/L
Conductivity:	+/- 0.5% +1uS/cm typical +/- 1% max range
ORP:	+/- 0.5mV
pH:	+/- 0.1 pH unit
Temperature:	+/- 0.5° C
Housing:	PVC, acetal, titanium, 316 stainless steel

Doppler Pellet Sensor	
Sencing area:	2,5m x Ø 2,5m (8´x 8´diam.)
Sencing method:	Acoustics (Doppler effect)
Depth rating:	Limited by cable
Housing:	Polyethylene/aluminum/bronze
Camera:	Monochrome





Infrastructure for cameras and sensors

AOS OxyBox - ideal for accurate environment logging and site surveyor

No need for additional infrastructure, the system has built in Iridium communication and battery. One standard unit and optional number of sensors

CAP and SmartBox - wireless infrastructure for cameras

A connection point for all our underwater cameras and winch. With transmission of up to 6 parallel video channels the system suits all types of farm sites.

CSU - Wireless infrastructure for both HR cameras and sensors

One connection point for camera and sensors as oxygen, current, temperature and Doppler Pellet Sensor. With transmission of up to 6 parallel video channels the system suits all type of farm sites.

Hard wired solutions - when simple stability counts

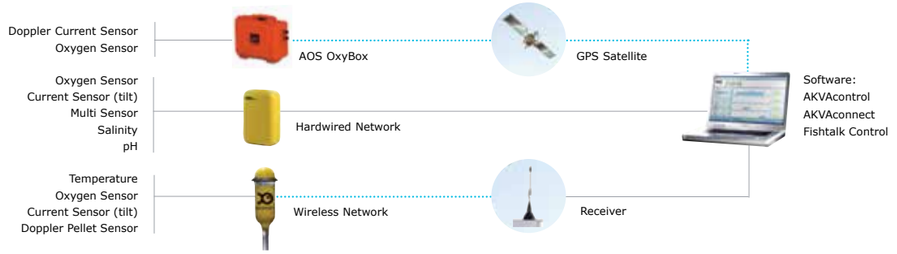
Infrastructure that fulfil your need for fixed solutions. Adapted and customized for each site – various sensors and cameras can be adapted to the system.

AOS OxyBox	
Iridium communication:	Standard
Doppler Current sensor/profiler	Optional - 1 sensor
Oxygen Sensor	1 - 3 sensors
Power supply:	Internal replaceable battery 3 - 6 moths lifetime

Model	SmartBox	CAP
Video:	Maximum 6 parallel channels	
Above water camera:	In front	In the top
Under the water:	All models of our underwater cameras	
Camera Winch:	Standard	HT Winch
Power supply:	Battery (12V) or mains 230V	
Housing:	Aluminum/ Delrin	Aluminum/ PC/Stainless steel

Model	CSU
Video:	Maximum 6 parallel channels
Above water camera:	In front
Under water:	All our models of underwater cameras
Winch:	Standard Winch
Power supply:	Battery (12V) or mains 230V
Sensor:	Aluminum/ Delrin

Hardwired transmitter	
Wired network:	Ethernet 100/1000Mbit - customized solutions, depend of site layouts and distances Ethernet, Coax or fiber cables.
Above water camera:	Surveillance camera with P/T/Z
Under water:	All our models underwater cameras
Winch:	Standard and Winch HT
Sensors:	Both Optical Oxygen sensor and temperature sensors and either current sensor – tilt or Doppler pellet feed sensor
Power supply:	Mains 230V



Vicass HD Biomass Estimator

Measures length and height with high accuracy

The new **Vicass HD (High Definition)** will provide farmers with accurate and efficient biomass estimation, taking high quality digital stereo images of the live fish swimming in the cage.

The images are analyzed in order to determine average weight of each fish. Vicass HD has high accuracy, capacity and speed and the camera unit captures 300-500 images at three different depths before they are analyzed.

The red graph is here showing calcultated fish weight in different weight classes.

Accurate biomass estimation, taking high quality digital stereo images of the live fish while swimming in the cage or tank.

New Vicass features:

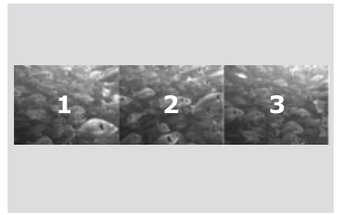
- Possible to zoom images for exact data input.
- The weight distribution curve is continuously updated while fish is being entered/recorded by clicking.
- Measures fish sizes at a distance from 60cm up to 2m from the camera.
- Better image overlap because lenses on the new camera are located as little as 15cm apart.

Vicass HD estimation

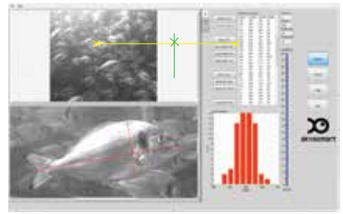
A stereoscopic video image measures the height and length of each fish. Advanced geometry algorithms accurately calculate the live weight of the fish.

Models are now available for species like:

Atlantics, Chinook, Coho, Tasman Salmon, Rainbow Trout, Altantic Haddock, Red Sea Bream, Med. Sea Bass/Bream, Striped Jack, Yellowtail, Japanese Amberjack and Southern Blue Fin Tuna.

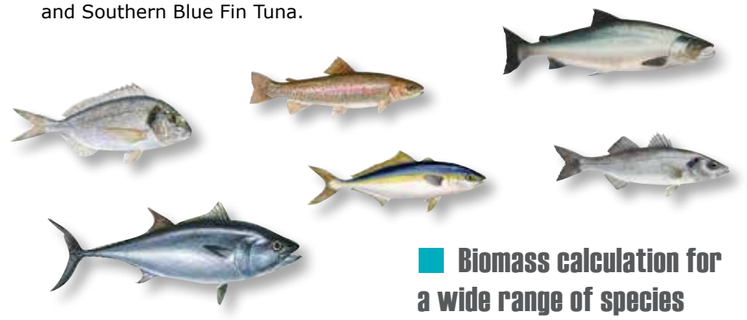


Grabbing of images



Analyzing

Reporting



Biomass calculation for a wide range of species

Vicass HD	
Power supply:	4A
Ingress protection:	Camera unit: IP68
	Field computer lid open + plugs inserted: IP64
	Field computer, lid closed: IP67
Camera size: length/ width/height - weight:	515mm x 130mm x 195mm - 16kg
Field computer size: length/ width/height - weight:	485mm x 392mm x 195mm - 12kg

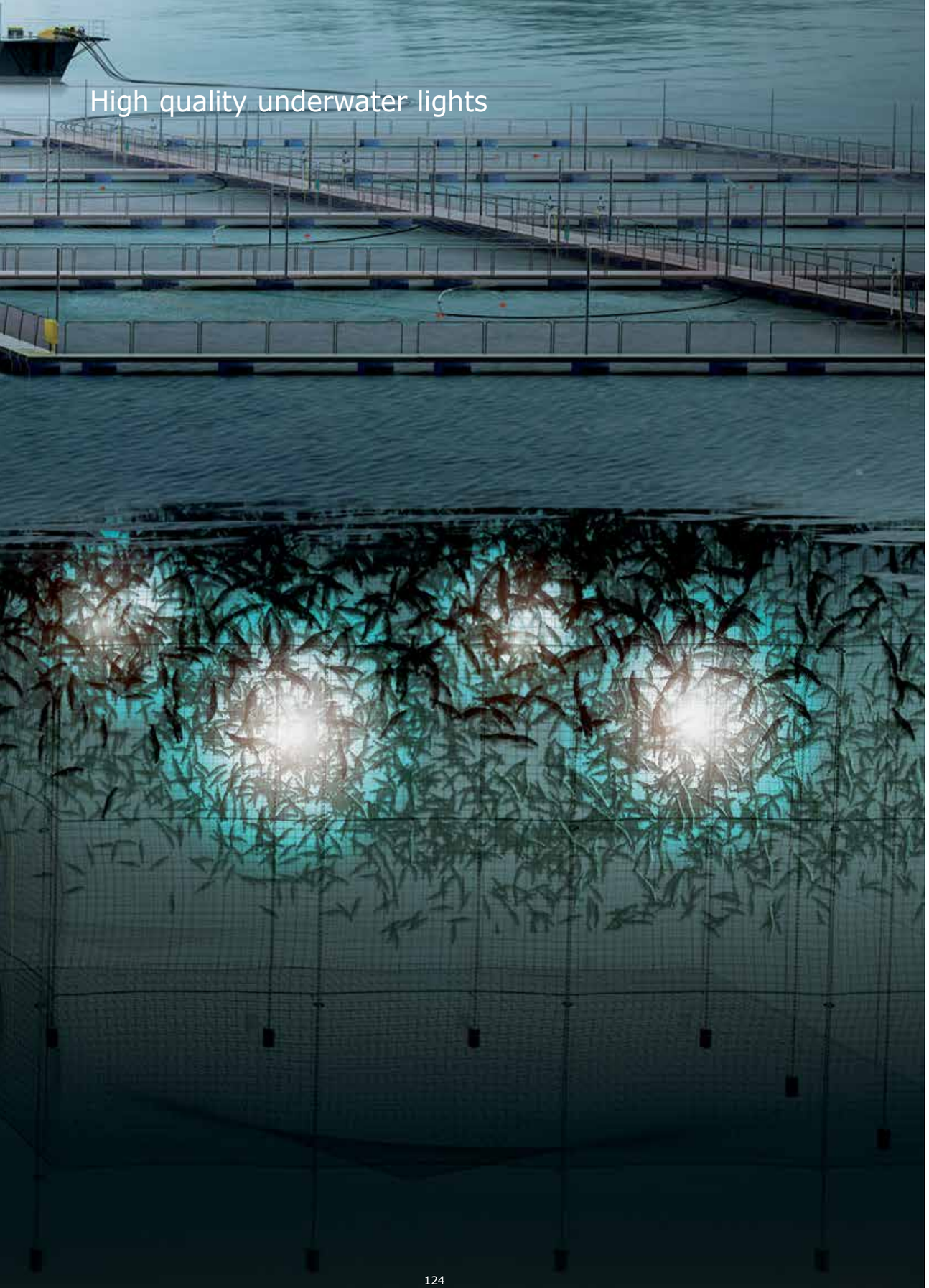
akvasmart™

Underwater Lights

Stable and accurate lighting increases profits

The correct use of underwater lights for many aquaculture species, ensures reduced fish maturation. In addition it results in faster growth and more effective feed utilization. The Idema Underwater Lights series are adapted for smolt and juveniles in small tanks, as well as for salmon, cod and other fast growing species that require light in larger cage farms. The high quality underwater lights have excellent light distribution, the design allows for for easy bulb replacement, functional design and a rugged construction.

- Qualty is always profitable.



BlueLED or metal halogen lights?

For indoor locations we recommend 100W to 400W illumination. BlueLed or SubLite 250W/400W is the smart choice here.

Idema Underwater Lights are a smart solution in Artic areas where the light conditions are poor during winter time.

Accurate even light distribution throughout the biomass is vital in tanks with high density and turbid loaded water.

Idema Underwater Lights can easily be installed at various dephts, ensuring stable and accurate light distribution.

Expected service life on the LED bulbs is in the region of 50.000 hours!

ISO approved Pyro Borosilicate glass to withstand rough use in cage farming operations.

Idema BlueLed 400W

Standard 35m or 55m rugged underwater cable (urethane cable), and a waterproof connection plug.

An extra strong construction that is almost maintenance free.

Idema SubLite 1000W

Idema BlueLED 400W is a perfect light solution for cage farms with medium or large cages.

Idema Underwater Lights are often used for salmon, trout, cod and other fast growing species.

Light treatment is also successfully used for smolt and juveniles in tanks and cages of different types and sizes.

More than 16.000 Idema Underwater Lights have been delivered world wide in the last 15 years.

Up to 8 times stronger light effect with the new BlueLed 400W!

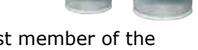
akvasmart™

Bright solutions for a wide range of tanks and cages

BlueLED 100W with blue light rays, have the highest penetration in seawater, and therefore the greatest efficiency. LED (Light Emitting Diode) is often called ´eternity light´ and is the most cost effective light solution on the market – and a perfect match to a diesel generator. The light diodes have extremely long duration with a predicted service life of up to 50.000 hours! Which means, no bulb changing for many years ahead. Recommended use: Tanks and smaller cages.

NEW BlueLED 400W with blue light rays is our newly developed luminaire for the sea cages. This luminairie is utilizing the newest High Intensity LED-technology with almost four times more effective light source than the BlueLED 100W. The blue colour has proven to be the most efficient when it comes to effect on biology in the fish. LED luminaires can provide more effective output from each luminaire compared to other lamp technologies. It saves cost on power generators, less power use and uses less copper in the installations. All this in addition to a long service life of the luminaire. Recommended use: Medium and large cages.

SubLite Integra 250W/400W is the smallest member of the SubLite family. The light can be offered in two luminosities for smolt, juvenile and smaller locations. This model is often used in cod farming with lights placed at various depths for a smooth distribution of light all over the cage. The light bulb and the electronic control device is integrated in the housing compartment and has a service time in the region of 5.000 hours. Recommended use: Tanks, smaller and medium cages.



SubLite Integra 1000W is our bestseller for salmon farms and the most rugged light unit in the market. It is placed at various depths and the powerful light ensures an excellent spread. The light bulb and the electronic control device is integrated in the housing and is easy to install. This unit also has a service life in the region of 5.000 hours. Recommended use: Medium and large cages.

SubLite Standard 2000W - the most powerful solution we offer. It provides extra strong lighting in large cages where there is a need for strong light conditions without using a lot of separate units. It features solid construction with a separate connection box and a service life in the region of 5.000 hours. Recommended use: Large cages.

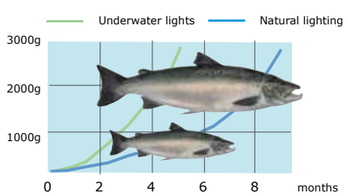
Underwater Lights Specifications

Specifications:	BlueLed 100W	BlueLed 400W	Integra 250/400W	Integra 1000W	Standard 2000W
Operating voltage:	230 VAC/50Hz (24DC)	230 VAC 50Hz (60DC)	230 VAC 50Hz	230 VAC 50Hz	230 VAC 50Hz
Starting current 0,5 second:	1,0A (230W)	1,8A (400W)	2,45A (563W) / 3,0A (690W)	8,0A (1840W)	13,0A (2990W)
Starting current 1 second:	2,5A (115W)	1,8A (400W)	1,9A (437W) / 2,0A (460W)	6,4A (1472W)	12,1A (2783W)
Operating current (2 minutes):	0,5A (106W)	2,15A (480W)	1,3A (299W) / 1,8A (414W)	5A (1150W)	9,35A (2150W)
Total efficiency:	115W	480W	275W / 460W	1065W	2070W
Service life with even colour:	appr. 50 000 hours	appr. 50 000 hours	appr. 5000 hours	appr. 5000 hours	appr. 5000 hours
Light source:	1080 LED	184 LED	HQI-T 250D / HQI-T 400D	HQI-T 1000D	HQI-T 2000D
Color temperature (Kelvin):	20000 K	20000 K (480 nm Blue)	5300K / 6100K	6000K	4400K
Luminosity:	-	-	20 000 Im / 35 000 Im	85 000 Im	190 000 Im
Weight, light housing:	8,5kg	11kg	7kg / 10kg	21,6kg	11kg
Weight, with cable:	14kg (appr. 2 l. oil)	19kg (appr. 2 l. oil)	11kg / 14kg	28kg	17kg
Weight, connection box:	-	-	-	-	19,2kg
Size, length + Ø:	641mm + 120mm	641mm + 120mm	648mm + 140mm	818mm + 180mm	642mm + 140mm
Material in the main housing, density:	POM 1,41g/cm³ DIN 53479 - L15	Aluminum 6082 T6 2,7g/cm³	POM 1,41g/cm³ DIN 53479 - L15	POM 1,41g/cm³ DIN 53479 - L15	POM 1,41g/cm³ DIN 53479 - L15
Material in connection box:	-	-	-	-	Fire coated aluminum
Pyro Borosilicate glass 3.3:	ISO 3585- 2,23 g/cm³	ISO 3585- 2,23 g/cm³	ISO 3585- 2,23 g/cm³	ISO 3585- 2,23 g/cm³	ISO 3585- 2,23 g/cm³
Cable, standard lenght:	PUR 3G1,5 35m or 55m	PUR 3G1,5 35m or 55m	PUR 3G1,5 35m or 55m	PUR 3G2,5 35m or 55m	PUR 3G2,5 35m or 55m
Cooling fluid:	Silikon fluid	Silikon fluid			
Recommended use:	Tanks /smaller cages	Medium & large cages	Tanks /medium & small cages	Medium & large cages	Large cages

Blue light *Daylight*

Note: Specifications are subject to change without prior notice.

We base our CE- marking on tests run by Nemko according to the EMC and LVD directives.



By using extra light on i.e. salmon, you will achieve faster growth and get higher harvest weight as opposed to not using underwater lights.

You can easily install the underwater lights at fixed depths and positions by using buoys and ropes.

AKVA group offer a regular service visit with equipment control and maintenance, including a detailed status report.

akvasmart™

Production and process control software

Intelligent IT solutions

AKVAconnect, Fishtalk and Wisefish are unique tools that integrate fish farming operations processing. This ensures optimum efficiency, excellent fish quality and increased profitability. The software covers all needs for process control, production control and planning.

Fishtalk: This software covers most aspects of the biological production control and planning, as well as production costing and budgeting. Reports and analysis are the basis for decisions, both long term and short term, and provides historical overview, status and prognosis.

Wisefish: Gain complete control of costs with the ability to apply detailed costing at the site or even cage level. You can easily manage the complete cycle from smolt to harvest and delivery to the customer and capture a detailed fish history.

AKVAconnect: A software platform that is designed for optimal control of the processes and activities on fish farms. The system offers full control, surveillance and integration of machines, sensors and all processes on both sea and land based fish farms.

Complete software solutions from AKVA group

Complete Value Chain Control

A result of more than 35 years of aquaculture experience

Our software is in use by most Norwegian aquaculture companies, a strong testimony to the fact that AKVA group offers aquaculture software solutions that are second to none! Fishtalk software gives a fast and detailed summary of when the fish will be ready for the market, as well as trends in production costs over time. Easily viewed, through simulating changes in growth conditions, the environment, feeding regimes, feed prices, smolt costs, harvests, and numerous other planned or simulated factors, the biological and financial consequences of changes in underlying conditions.

Full control from broodstock to customer.

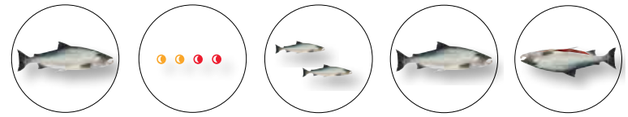
An interactive control platform

AKVAconnnect provides the ability to gather data and combine information from all levels of your aquaculture operations, including controlling and monitoring all technical processes. This improves management´s production overview and control. AKVAconnect also provides the maintenance team with dedicated logging of all parameters associated with the equipment on site.

AKVAconnect allows full process control via internet on a PC, iPAD or Smartphone.

Fishtalk – From broodstock to harvest

Fishtalk captures data from broodstock to harvest and has powerful reporting and analysis capabilities. With the financial and planning modules Fishtalk becomes a primary tool, from day to day use on a single site to mapping out a 5-year plan for the whole company.



Broodstock | Hatchery | Juvenile | On-growing | Harvesting

Wisefish - Fully integrated end-to-end ERP solution

Combine fish stock inventory details captured in AKVA group's premier Fishtalk software with the advanced accounting features of Wisefish. Capture the total Cost Of Goods Sold of live fish stock inventories, distributed down to the site or even cage level.

Processing | Logistics | Sales | Customer | Tracking

AKVAconnect - Process control platform

AKVAconnect software is designed for optimal industrial control of the processes and activities on fish farms. The system offers full control, surveillance and perfect integration of machines, sensors and all processes on a fish farm.

Current control | Oxygen control | Temperature control | Camera control | Alarm system

Underwater Lights | Feed control | Salinity | Water quality | pH values

Production control and planning

Dedicated software ensures safer and more cost effective solutions.

From Broodstock to Harvest

The Fishtalk-family

We often say that the modules in Fishtalk are seamlessly integrated. But **Fishtalk Control**, **Plan and Finance** are in fact part of the same software. Shared by the modules is one single database containing all data, as well as common functionality and models. This resulting in a better user experience and more consistent software.

Biology and finance, past and future are dimensions that goes hand in hand in Fishtalk. The reporting and analysis tools greatly demonstrate the effect of including all 4 areas in the same software solution.

Effective and accurate control, budgeting and planning.

Additional modules like **Fishtalk Connect** will provide a version stable interface to third party applications like Business Intelligence or reporting tools. It also contains **OLAP** cubes using **Microsoft Analysis Services**. The cubes are already prepared to go with data from Fishtalk, giving you the option to integrate using standards like Excel and similar.

Other Fishtalk software solutions

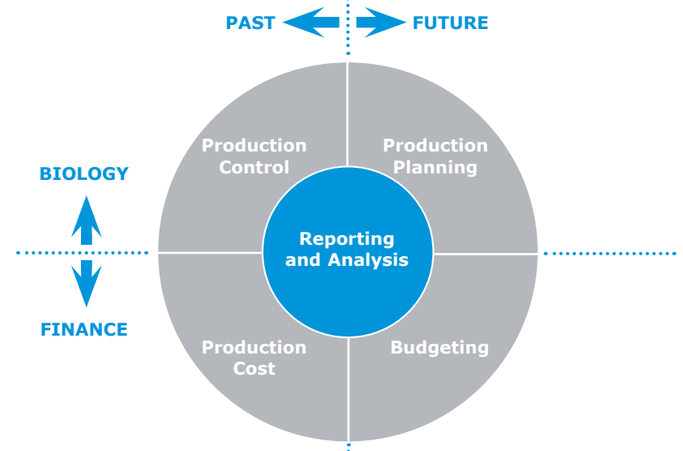
Fishtalk Lice and Fishtalk Wrasse will greatly improve your overview of the lice situation, and with **Fishtalk Tide** you can plan activities taking the tide level and current into consideration. You may use **Fishtalk Benchmarking** to benchmark your production, and finally **Fishtalk Broodstock** closes the loop, giving you full traceability across generations - down to individual level!

Fishtalk Control

Fishtalk Control software provides producers complete control of the production from broodstock to harvest. Used by single sites as well as large corporations, Fishtalk is the most complete production control software in the market.

Fishtalk Plan

Fishtalk Plan is a user friendly tool for production planning. Yet it includes advanced features such as rolling forecasts, scenarios and flexible plan structures, making it a more powerful tool. The flexible reporting system helps you take operational decisions by comparing different scenarios efficiently.



Fishtalk Finance

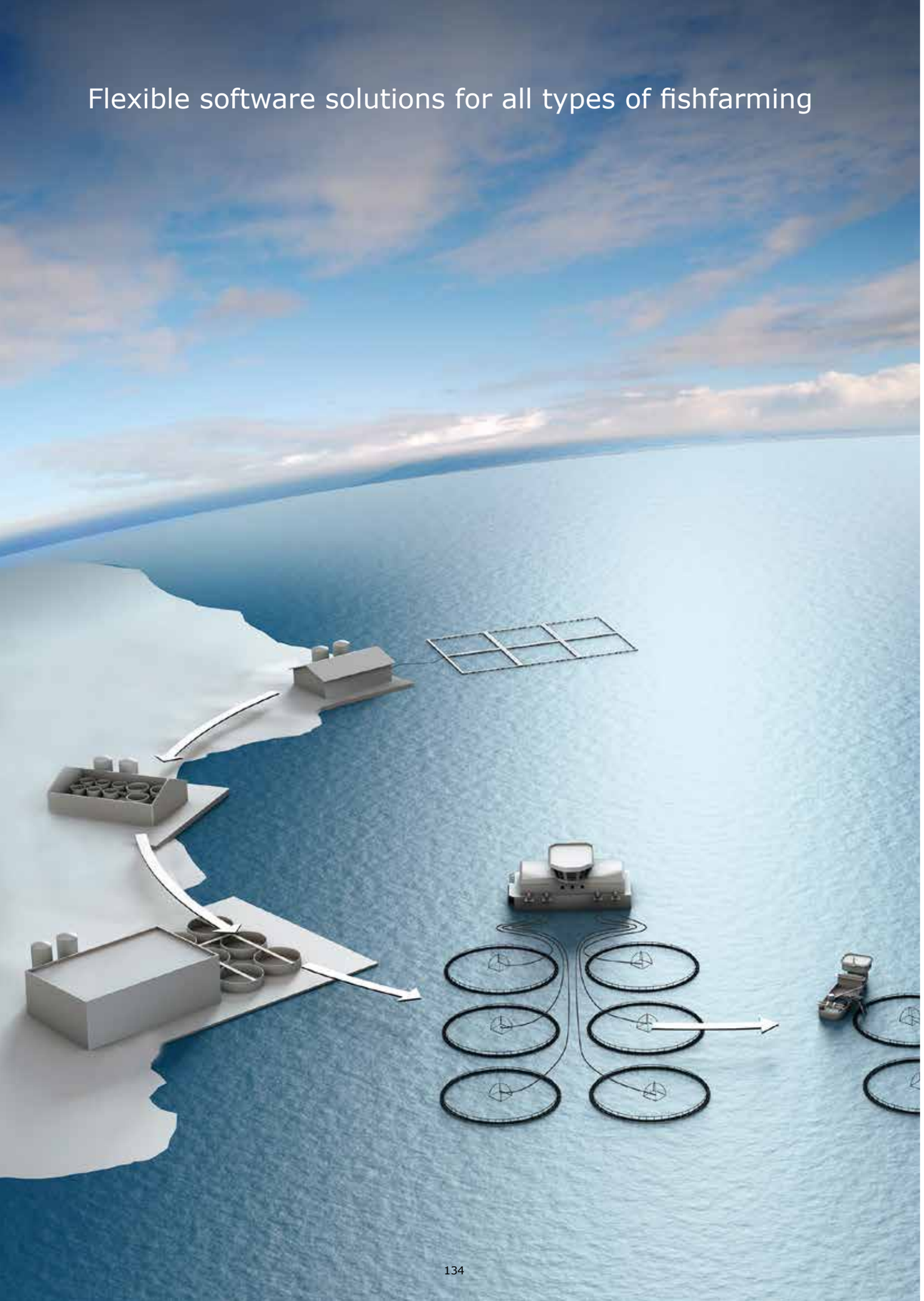
Production cost calculation is easy with Fishtalk Finance. A minimum of setup is required, and you will be up and running in no time. Simply import data from accounting once a month and you will easily obtain new insight into your cost of production.

Fishtalk Finance

Budgeting using Fishtalk Finance is simpler than ever. Just define your cost models and any production plan can be used to generate the major cost factors like feed, transport and harvest. Comparing budgets generated from different scenarios quickly gives you the financial impact of your decisions.

The Fishtalk-family software ensures complete value chain control.

fishtalk™



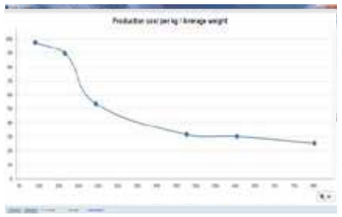
The Fishtalk-family

Fishtalk Control

Fishtalk Control provides a complete overview of the biological status of the production. The tool keeps track of all activities through the sophisticated log; from unit and farm level, to top executive management.

Fishtalk Plan

Fishtalk Plan provides optimal production plans according to your strategies. This gives you a unique basis for making qualified operational decisions based on various scenarios for each species.



Fishtalk Finance

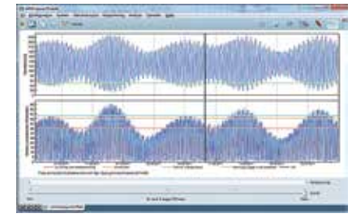
Fishtalk Finance enables simulation of the financial effects of the planned activities. The solution provides in-depth information according to the biological plans, budgets and forecasts, - all based on a set of different scenarios.

Fishtalk Lice

Fishtalk Lice shows lice developments and effect of treatments for each cage or region. Fishtalk Wrasse provides stocking numbers for each cage and percentage of Wrasse vs. salmon.

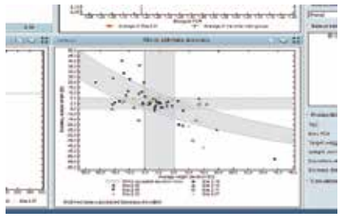
Fishtalk Wrasse

Fishtalk Wrasse ensures a full updated overview of the treatment. The module extends the lice module in Fishtalk and provides an unique tool for monitoring and analysing.



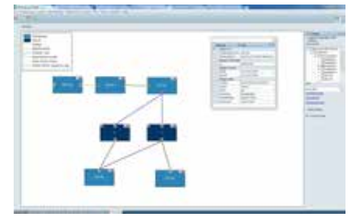
Fishtalk Tide

Fishtalk Tide provides predicted hourly tide levels and change in tide level. This makes it easy to plan operations that depends on slack tide and low currents, like net changes and lice treatments.



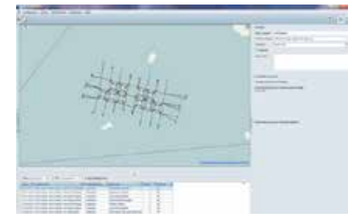
Fishtalk Benchmarking

Fishtalk Benchmarking provides fast and simple rankings compared to established production goals, such as growth rates, feed conversion rates, hit rates and other KPIs as VF3 and SGR.



Fishtalk Broodstock

Fishtalk Broodstock seamlessly integrates broodstock and production control, and provides full traceability to genetic origin and across generations of broodstock. It captures group level information as well as data for individual fish, like genetic markers and quality samples.



Fishtalk Equipment

The new Fishtalk Equipment software organizes all the farming equipment with documentation and maintenance, maintaining full traceability on component level. Comply with the Norwegian NS9415:2009 and NYTEK.

For more detailed software information, please visit:
www.fishtalk.com

fishtalk™

The world´s leading ERP solution for seafood

The Wisefish software family

WiseFish is developed as an industry-specific layer built on the backbone of Microsoft's business solution software – Dynamics NAV. Dynamics NAV brings together finance, manufacturing, customer relations management, analytics and e-commerce with a core, world class accounting system.

Wisefish - award winning ERP software.

The leading ERP solution for seafood producers, distributors, processors, brokers and traders

WiseFish, Certified for Microsoft Dynamics, is a comprehensive family of software products that combine the best of standard Microsoft Dynamics NAV with a wide range of seafood industry-focused packages and business intelligence analytics tools. Take advantage of role tailored, information-driven workflow which supports your business goals:

- **Innovative industry solutions for the entire seafood value chain.**
- **Built on Microsoft's Dynamics NAV**
- **Processing, Planning, and Demand Forecasting**
- **Lower inventory costs and improve food safety with integrated HACCP-compliant Quality Control**
- **Inventory managed by both catch weight and regular weight**
- **Primary processing and Value added production tools**
- **Industry-specific functionality straight out of the box**

For more detailed software information, please visit:
www.wisefish.com

Wisefish Aquaculture

Account for live fish stock inventories from smolt to harvest and beyond using advanced financial forecasting and cash flow management tools, complete vendor and customer management, HACCP-compliant quality control, and end-to-end traceability.

Wisefish Quality

Easily manage increasingly stringent legislated and customer mandated rigorous quality control through third party audits, SQF, or other recognized programs. WiseFish Quality is fully compliant with HACCP specifications. End to end traceability is a click away in case of a recall.

Wisefish Processing

Seamlessly integrate inventory control, quality inspections, lot tracking, catch weight management, Electronic Data Interchange (EDI), and expiration date management with complete and detailed costing for full financial and regulatory control of your seafood processing operation.

WiseFish Peripherals

WiseFish Peripherals are applications that run outside of WiseFish and integrate with:

- Scales (Marel, Digi, Scanvaegt, Mettler Toledo, Rice Lake, etc.) through serial or TCP / IP ports
- Scanners (Symbol and Intermec) through USB, keyboard wedge, or serial port.
- Barcode printers – (Zebra, Intermec, Toshiba, etc.) Uses BarTender labelling software - the world's leading design and print software for labels, barcodes, and RFID tags.
- Dynamics NAV/WiseFish database (Connected to SQL Server through ODBC).

Box or Pallet level detail with optional barcode enabled identification. Track material movement within a warehouse, between warehouses, and beyond.

Wisefish Trade

Inventory Control, Broker Commissions and more for fast paced seafood sales operations. These tools are indispensable in meeting the rigorous buyer requirements of today's seafood market.

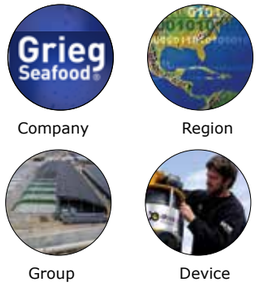
BI Tools

Affordable and user friendly BI and analytics reporting software and integrated data warehousing tools, including WiseAnalyzer are available as part of the WiseFish suite. Create customised reports, set targets, see results and easily understand the business implications of the data with easy to use SQL report builder tools.

AKVAconnect software

Role based control platform

AKVAconnect is a new process control platform used to connect to and keep control on everything from local farm sites to large international aquaculture corporations. The system is open ended and compatible with all types of equipment, sensors and technical installations. Smart 3D design with interactive control functions, makes it incredibly easy to operate.



A reliable software concept

AKVAconnect Site Control provides full overview and shows you the operating status of every component on your farm at all times. It also pin-points an alarm to the exact location of a problem should it occur.

The main overview provides fast access to the present state of the entire system.

The environmental software can easily supply individual data from each site.

AKVAconnect provides the ability to gather data and combine information from all levels of your aquaculture operations.

AKVAconnect is fully customizable, bringing forth exactly the information that the individual user needs.

The smart feeding control functions, well known in AKVA Control, are also avalible if needed.

Get the full picture in seconds...

The AKVAconnect-family

Site Control

Site suveillance provides detailed information and status reports from multiple sites in real-time and is a very useful tool when you centralize the operations.

AKVAconnect alarm system supports full traceability; "who, did what, and when" is not a question anymore.

Camera Control

Both analog and digital cameras are integrated in the system, and are fully controllable from any site or position.

Multible scalable camera windows can be shown and controlled directly on screen and monitored via internet using a Remote Video unit.

Remote Video

The advanced wireless sensor network provides the opportunity for live video images from the feed barge and each feed cage.

With our Remote Video system and SmartEye Surveillance camera, you can zoom in on details.

Environmental Control

Monitor and control all parameters in your production environment to secure maximum stability in your system. Temperature, oxygen, salinity, pH etc.

Process Control

All devices (are closely) can be monitored and controlled. Information about the present state, running hours and maintenance is conveniently monitored.

Control Menu

It is easy to navigate the different sites and systems through the intuitive menu.

Achieve full access to the process on the farm via internet using a PC, iPAD or a SmartPhone.

The new AKVAconnect-family provides optimal process control.

Service, support and training

Advanced aquaculture needs professional maintenance

As aquaculture equipment becomes more advanced, the need for professional service and preventive maintenance increases. AKVA group offers global professional service on all products.

Through on-site visits, AKVA group technician will get a complete overview and understanding of specific solutions on the site, specific requirements, preferences and work routines of local staff.

Sufficient training of your staff and managers will minimize the amount of frustration that builds up while browsing through a manual in search of a solution to a problem. Training of staff, face-to-face is always a smart investment.

Professional aquaculture training

Preparing, Training, Follow-up

All training programs are tailor-made and planned in close cooperation with the customer. Further on, and to ensure the highest possible learning outcome, the following stages are followed:

1. **Individual self-paced preparation phase**
2. **Face-to-face training**
3. **Close post-training follow-up**

The courses can take place in one of AKVA group's dedicated training facilities or, if preferred, at the customers site. The classes are instructed by AKVA group's dedicated specialists, ensuring the highest possible quality of the courses. Some of the most popular training modules include:

- **Product Specific Training, spanning the full AKVA group product range**
- **Advanced Product Maintenance**
- **Software Training**
- **Quality Farming programs (Level 1 & 2).**

Training is a key component of employee development, and is guaranteed to have a positive effect on staff motivation and operation. The invaluable relations and shared knowledge of the product specialists, ensures optimal utilization of all your AKVA technology.

The extensive curriculum includes numerous practical and theoretical product training courses, as well as a comprehensive 2 year Quality Farming program.

A range of useful courses

AKVA group's software courses are among the most popular. The course can also easily be tailor made for each aquaculture farm.

The 2 year Quality Farming program ensures production optimization and improved results on the bottom line.

Well trained emploiees is a smart investment. It will improve the results and reduce the failures.

AKVA group offers a wide range of advanced aquaculture technology, and provides customized product training on demand.

Experienced and highly qualified AKVA group personel will teach the classes, both at the main courses and out on the customer´s locations.

Advanced aquaculture needs profesional maintenance

As aquaculture equipment becomes more advanced, the need for professional service and preventive maintenance increases. AKVA group offers global professional service on all products; on or off location including:

- **Fixed pricing on reconditioned critical spare parts with guaranteed local availability.**
- **Technical telephone support during local office hours.**
- **Professional consultancy services.**
- **System upgrades, including fixed pricing on specific rebuild kits.**
- **Fast service response times.**

SmartService - a safe solution

Regular service prevents downtime, and thus ensures predictable and uninterrupted production. AKVA group's comprehensive and flexible Smart Service agreement is a safe solution providing a wide range of benefits, such as:

- **Prioritized 24 hour telephone support.**
- **Discount on spare parts.**
- **Discount on service technician rates.**
- **Discount on software upgrades.**
- **Discount on AKVA training programs.**
- **Dedicated AKVA group service representative during office hours.**

It is recommended that the Smart-Service agreement is upgraded to include regular on-site visits by experienced technicians resulting in:

- **Status report of the site.**
- **Yearly maintenance documentation in accordance to local HSE standards.**
- **Development of regular preventive maintenance routines.**

Through on-site visits, AKVA group technician will get a complete overview and understanding of specific solutions on the site, specific requirements, preferences and work routines of local staff. Adding a face factor to this will ease communication between the site staff and the dedicated technician in the future.

Software Support - a necessary tool

Turning a software solution into the optimal work tool requires both understanding about local knowledge, work routines and preferences. Achieving optimal control on the farm often takes settings, tuning and adjustment of the software solution according to local requirements and priorities. For its turn-key customers, AKVA group's dedicated software team offers:

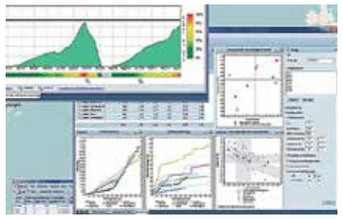
- **On-site support**
  Telephone support
  Online support
- **Implementation**
- **Training**
- **Upgrading of licenses**
- **Consulting**
- **Tailor-made solutions**
- **On-site training**
- **In depth training**
- **Securing long time investments**

Service is a smart insurance

With a SmartService agreement, the farm manager can focus completely on the fish, while our technical staff looks after the equipment.

More advanced aquaculture technology increaces the need for more professional service, support and maintenance.

AKVA group offer a regular service visit with equipment control and maintenance, including detailed status reports.



Software support can include training, online support, consulting, implementation, server control & server security oe.

Financing - loan or leasing?

Financing through Export Credit Norway

In close cooperation with Export Credit Norway, AKVA group ASA can offer competitive financing arrangements for our customers in the export markets.

Export Credit Norway extends loans to large and small companies abroad for purchases from Norwegian exporters, offering favorable long-term financing. The company manages the whole lending process, including processing, documentation, disbursement and loan administration.

Export Credit Norway is a limited liability company wholly owned by the Norwegian government, and they finance export contracts ranging in value from a few million to several billion Norwegian kroner, across sectors and worldwide. The loans comply with the OECD framework on officially supported export credits.

AKVA group´s professional teams have decades of experience in planning and designing aquaculture projects.

Export Credit Norway offers competitively priced fixed and variable interest rates. Loan on Commercial Interest Reference Rate (CIRR) terms, may be given with a repayment period of between 2 and 18 years depending on the project type. Fish farming projects have so far qualified for a repayment period of 2-5 years, but a longer period might be achieved on a case-by-case basis.

CIRR is a free of charge interest rate option for the borrower in the period from acceptance of the loan until delivery of the equipment/service. Export Credit offers financing of up to 85% of the export contract.

The financing requires backing from the Norwegian Guarantee Institute for Export Credits and/or commercial bank(s) for 100% of the loan to cover political and commercial risks, related to the credit given in the whole repayment period.

Lending Process

All prospective borrowers that meet the requirements will receive a loan offer. For customers with low access to CAPEX this has proven to be a lucrative option to traditional financing.

Competitive financing from Export Credit Norway may benefit both AKVA group and customers as customers will be supported in their investments making transactions in the export markets possible at lower risk.

For more information, please visit;
www.eksportfinans.no

Competitive solutions

Flexible water treatment systems for salt- or fresh water, both outdoors and indoors installations, are often made possible through export finance.

Feed systems, monitoring equipment, net cleaners, and underwater lights can be leased.

New innovative projects, both land based and cage farming aquaculture have been financed world wide.

A wide range of cages, feed barges and work boats of different types and sizes have also been financed.

Land Based Aquaculture

Your partner in advanced water treatment technology

AKVA group has more than 30 years of aquaculture engineering experience. Our team of world leading experts is renowned for designing sustainable recirculation systems that are second to none. Having delivered systems globally for more than 20 different species, AKVA group provides optimal water quality conditions for both fresh- and seawater operations.

Supplier of land based solutions for a wide range of species

A few years ago it was hard to imagine a supplier of complete land based aquaculture solutions. Today AKVA group steps into that role, with all the commitment and dedication it takes to become the preferred supplier-, maintenance-, service- and training partner for such companies worldwide. AKVA group's team of professionals have decades of experience supplying functional aquaculture technology to land based fish farming companies worldwide.

Your business will never be easier than this.

From single components - to complete solutions

Feed System

RotorSpreaders

Feeding Cameras

Underwater Lights

Environmental Sensors

Water Treatment Systems

Oxygen Cones

Sensor Network

Tank solutions

AKVA group tanks can be customized to any desired diameter and height thus making it possible to obtain perfect utilization of the available site space.

Water treatment

AKVA group has 30 years experience providing optimal water quality conditions for both fresh- and seawater operations.

Piping and pipework

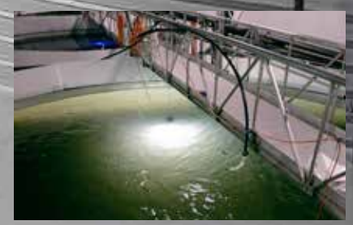
AKVA group has one of the most modern production lines for polyethylene pipes in Europe and thousands of kilometres have been delivered since 1971.

Feeding systems

The Akvasmart CCS Feed System will feed the correct amount, at the optimal rate, on time, every time.

Sensor systems

Environmental sensor data is of vital importance. A better environment will always improve your production.



Underwater Lights

Light treatment is successfully used for smolt and juveniles in tanks and cages of different types and sizes.

Polarcirkel Polyethylene (PE) Pipes

Maintenance free, flexible solutions

AKVA group has one of the most modern production lines for polyethylene pipes in Europe and thousands of kilometres have been delivered since 1971. The pipes are straight pressure pipes made from PE raw materials especially suited for continuous use in harsh environments, and are based on decades of experience in pipe technology. Polarcirkel pipes are available in a wide range of models, shapes and sizes to suit individual needs and offer many benefits over competing systems.

Extruder- and butt-welding PE is a proven and strong method of joining piping components.

No corrosion or decay is caused by the electrolytic process and no risk of material deterioration as algae, bacteria or multicellular organisms are unable to attach themselves to the pipes. Polarcirkel pipe production is certified under Det Norske Veritas (DNV), ISO-EN 9001 /ISO 14001 Standard and NS-EN 12201.

All installations are carried out by certified welders which ensure accurate and quality assured installations of PE 100 pipes.

Maintenance free pipes

AKVA group produces PE pipes with state-of-the-art machinery, and offers complete pipe systems for high and low pressure applications. High quality raw materials are used throughout, and full documentation of the pipe production process can be provided by an in-line scanning system. This provides cost savings as well as ensures long, maintenance free lifespan of the pipes.

PE piping and plumbing parts are suitable for a wide range of industrial use, chemicals, corrosive fluids, sewage, sludge, water, food and agriculture granulates.

Industry and processing

The excellent corrosion and chemical resistance properties and long-term durability of PE pipe has resulted in the mining and process industries choosing polyethylene as their preferred pipework material.

Water and sewer

AKVA group offers a wide range of Polarcirkel PE pipes for underground water supply and sewage, all with outstanding performance advantages such as joint tightness, flexibility, abrasion resistance and extremely long durability.

AKVA group provides Polarcirkel solutions for water supply, outlet pipes, internal pipes, parts and fittings for hatcheries and land based aquaculture.

AKVA group offers a wide range of pipes and fittings from 20mm up to 1000mm diameter.

Sophisticated machinery produces pipes in a wide range of models, shapes and sizes to fit individual needs.

Feeding Pipes in various dimensions, wall thicknesses and coil lengths up to 1000 metres.

From extensive to intensive water treatment

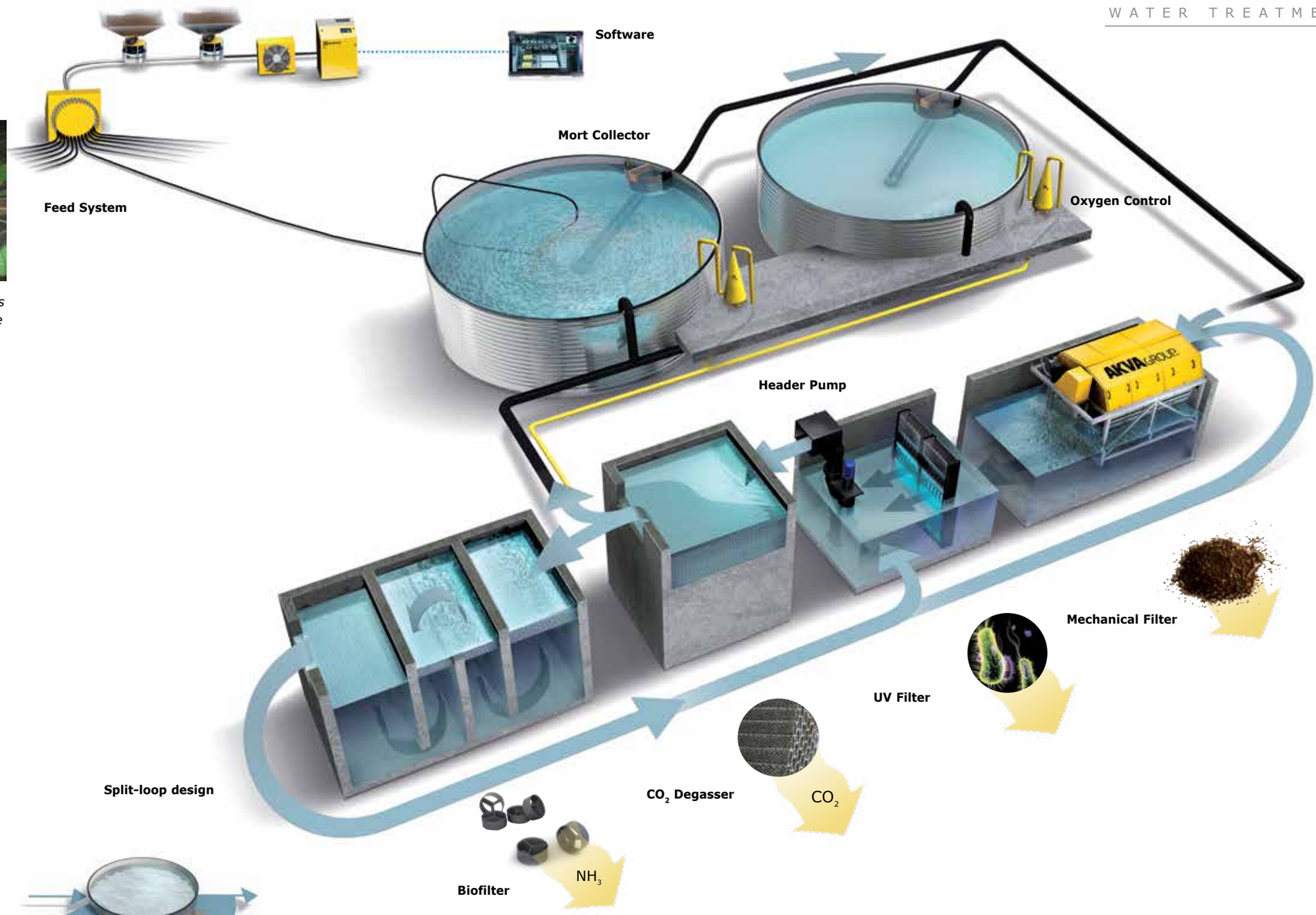
AKVA group offers a wide range of land based aquaculture technology, from single components to complete installations worldwide. The complete range of quality products and software provides maximum reliability and cost effectiveness.

Unlike the short history of cage farming aquaculture, land based aquaculture goes back thousands of years with most of the production being fresh water farms in China and Asia.

Land based aquaculture is today one of the fastest growing food industries in the world. Although most of the industry was developed as extensive fish farming in ponds with low technology solutions, the main reason for today's growth is the increased use of intensive solutions and the latest innovations in water treatment technology. This makes it possible to maintain excellent water quality combined with exceptional low water- and energy consumption.

Successfully spawned valuable species like sturgeon and tuna can reduce the pressure on wild stocks.

Over the last 20 years, energy consumption per kilo fish produced has been reduced by more than 80% while water recirculation has increased to more than 99%. In addition to freshwater, AKVA group also has unique knowledge in saltwater recirculation systems, making it feasible with profitable production of almost any species anywhere in the world. Our main success criteria include scientific competence, practical experience and close cooperation with both customers and research communities. This has enabled us to develop innovative and cost-effective solutions for most land based aquaculture projects.



Flow through system

The traditional form of landbased aquaculture with low level of water treatment technology. This form of aquaculture is commonly used on sites with vast amounts of water with a good temperature profile.

Re-use system

Re-use is often a result of a gradual increasing implementation of technology including for instance oxygenation and degassing. Depending on the level of technology, the Re-use relative to flow-through is often between 20 and 60%.

Recirculated system

Recirculation systems are currently being built all over the world and for many different species. A high level of technology allows a very high degree of water Re-use; normally in the range of 95-99% compared to the water consumption in a flow through system.

A wide range of land based aquaculture solutions prepared for various species.

For more information, order our Land Based Aquaculture Catalogue. www.akvagroup.com

Dedicated aquaculture solutions

AKVA group offers tailor made solutions for a wide range of species both land based and cage farming aquaculture. Here´s some examples;

Acipencer sp.

N: Stør - GB: Sturgeon - ES: Esturión

Rachycentron canadum

N: Cobia - GB: Cobia - ES: Cobia

Oncorhynchus mykiss

N: Regnbueørret - GB: Rainbow Trout - ES: Trucha Arco Iris

Salmo salar

N: Laks - GB: Atlantic Salmon - ES: Salmón del Atlántico

Dicentrarchus labrax

N: Europeisk Havabbor - GB: European Sea Bass - ES: Lubina

Salvelinus alpinus

N: Røye - GB: Artic Char - ES: Trucha Alpina

Coregonus lavaretus

N: Sik - GB: Common Whitefish - ES: Lavareto

Sparus aurata

N: Dorade - GB: Sea Bream - ES: Dorada

Gadus morhua

N: Torsk - GB: Atlantic Cod - ES: Bacalao del Atlantico

Ctenopharyngodon idella

N: Gresskarpe - GB: Grass Carp - ES: Carpa China

Cyprinus sp.

N: Karpe - GB: Common Carp - ES: Carpa

Sander lucioperca

N: Gjørs - GB: Zander - ES: Lucioperca

Hippoglossus hippoglossus

N: Kveite - GB: Halibut - ES: Halibut

Psetta maxima

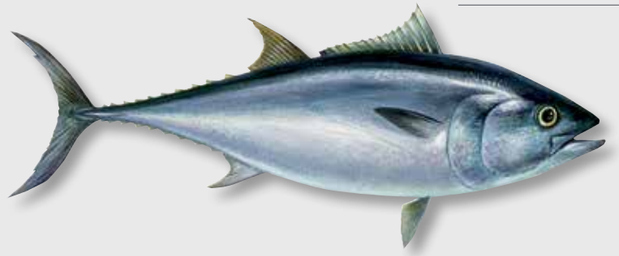
N: Piggvar - GB: Turbot - ES: Rodaballo

Solea solea

N: Sjøtunge - GB: Sole - ES: Lenguado

Pangasius sp.

N: Asiatisk Malle - GB: Striped Catfish - ES: Basa



Thunnus thynnus

N: Blåfinnet Tunfisk - GB: Bluefin Tuna - ES: Atún Aleta Azul

Oncorhynchus kisutch

N: Sølvlaks - GB: Coho - ES: Salmón Coho

Seriola sp.

N: Kingfish - GB: Amberjack/Kingfish - ES: Seriola sp.

Oncorhynchus tshawytscha

N: Kongelaks - GB: Chinook Salmon - ES: Salmón Rey

Haliotis sp.

N: Sjøøre - GB: Abalone - ES: Abulón

Oreochromis niloticus

N: Nilmunnruger - GB: Nile Tilapia - ES: Tilapia del Nilo

Lates calcarifer

N: Asiatisk Havabbor - GB: Barramundi - ES: Perca Gigante

Litopenaeus vannamei

N: Hvitfotreke - GB: Whiteleg Shrimp - ES: Camarón blanco

Labrus bergylta

N: Bergylte - GB: Ballan Wrasse - ES: Maragota

Ctenolabrus rupestris

N: Bergnebb - GB: Goldsinny Wrasse - ES: Tabernero

Penaeus monodon

N: Tigerreke - GB: Tiger Prawn - ES: Langostino Jumbo

Anarchicas minor

N: Flekksteinbit - GB: Catfish/Wolffish - ES: Perro del Norte

Holothuria sp.

N: Sjøpølse - GB: Sea Cucumber - ES: Pepino del Mar

© Scandinavian Fishing Year Book

Aquaculture continues to be the fastest growing animal food-producing sector

State of the world aquaculture

Automated mort collection

The compressed air is injected through a number of small holes in a separate air chamber.

AKVA group in cooperation with leading fish farming companies has now developed an automated, robust and very practical system for removing morts. The system is adapted to today's Polarcirkel plastic cages, Wavemaster steel cages, nets and various other site infrastructure solutions.

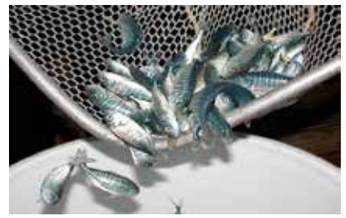
The world´s largest feed barge

New giant panorama feed barge!

The new **AC 650** from AKVA group has a feed capacity of 650 tonns. "In the future there will be a need for larger and more exposed barge solutions then today," commented the region manager in Bremnes Seashore Norway.

Regional aquaculture growth

Production within each region is diverse. World aquaculture is heavily dominated by the Asia–Pacific region, which accounts for 89 percent of production in terms of quantity and 77 percent in terms of value. This dominance is mainly due to China's enormous production, which accounts for 67 percent of global production in terms of quantity and 49 percent of global value. China produces 77 percent of all carps (cyprinids) and 82 percent of the global supply of oysters (ostreidae). The Asia–Pacific region accounts for 98 percent of carp, 95 percent of oyster production, and 88 percent of shrimps and prawns (penaeidae). Norway and Chile are the world's two leading producers of cultured salmons (salmonids), accounting for 33 and 31 percent, respectively, of world production.



New Zealand kingfish.

80 million tons by 2050

According to FAO projections, it is estimated that in order to maintain the current level of per capita consumption, global aquaculture production will need to reach 80 million tons by 2050.

Aquaculture has the potential to make a significant contribution to this increasing demand for aquatic food in most regions of the world; however, in order to achieve this, the sector and the fish farmers will face great challenges.

(Source: FAO - 2011)

Aquaculture statistics

World aquaculture production of food fish* by continent (million tons).

	2010	2011	Share
Africa	1.3	1.4	2.2%
Americas	2.6	2.9	4.7%
Asia	52.4	55.5	88.5%
Europe	2.5	2.7	4.3%
Oceania	0.2	0.2	0.3%
Total	**59.0**	**62.7**	

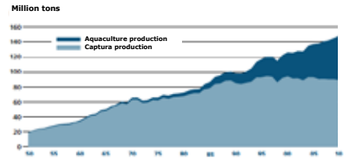
** Food fish = fishes, crustaceans, molluscs, amphibians (excluding crocodiles) and other aquatic animals (such as sea cucumber, sea urchin etc.) for human consumption.*

World top-20 aquaculture producers of food fish* (tons).

	2011
China	38 621 269
India	4 573 465
Vietnam	2 845 600
Indonesia	2 718 421
Bangladesh	1 523 759
Norway	1 138 797
Thailand	1 008 049
Egypt	986 820
Chile	954 845
Myanmar	816 820
Philippines	767 287
Brazil	629 309
Japan	556 761
Korea, RO	507 052
USA	396 841
Taiwan, POC	314 363
Ecuador	308 900
Malaysia	287 076
Spain	271 961
Iran	247 262
Total of top-20	**59 474 657**
Others	3 225 644
World Total	**62 700 300**

(Source: FAO - 2011)

World capture fisheries and aquaculture production



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• Workboats • Feed Barges • Feed Systems • Camera & Sensor Systems • Underwater Lights • Software

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